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CHAPTERS

ON THE

AIMS AND PRACTICE

OF

TEACHING

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AIMS AND PRACTICE

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TEACHING

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PREFACE.

The publication of these Chapters has been suggested by that widespread interest in education which characterises the Wales of to-day and promises so well for the Wales of the future. But the degree in which they may prove helpfully suggestive to the teachers of Wales is also the measure of their claim to the attention of teachers generally. Contributed, in response to the Editor's invitation, by writers whose knowledge and experience entitle them to speak with authority on the teaching of the several subjects of which they treat, and whose sphere of educational activity lies for the most part outside the Principality, they include few, if any, details of purely local interest. Both in England, where so much is said about the organisation of secondary education and so little done, and in America where so much is said *and* done in the matter of education generally, the issue of an inexpensive volume dealing with the efficient teaching of most of the respective subjects of an ordinary school curriculum will, there is reason to believe, be welcomed as an endeavour to meet a want which is increasingly felt. No attempt is here made to appraise the relative claims of conflicting subjects to a place in the curricula of the schools. We should probably never have witnessed the more acute phases of the dispute between the 'Ancients' and 'Moderns,' if due attention had been paid, on

either side, to the problem how best to teach whatever is taught. For, to quote the words of the Royal Commission on Secondary Education, "the true worth of instruction—that is to say, its vitalizing influence on the scholar's mind—depends less than is commonly supposed upon the particular subject through which the mind is approached, and more upon the stimulative method in which the mind is roused. School curricula, no doubt, need to be in some cases extended as regards the whole range of a school's work, and in others restricted as regards the number of subjects to be taught to the particular scholar at the same time. But it is, after all, not so much in the remodelling of curricula as in the improvement of methods, and, above all, in the supply of more highly educated and skilful teachers that educational progress must in future consist."

The cordial thanks of the Editor are due to the Syndics of the Cambridge University Press, who, while not necessarily endorsing all or any of the views expressed in these Chapters, have generously undertaken their publication.

The Editor's own task has been a pleasant and an easy one; and for its performance he aspires to no higher meed than that bestowed by good Roger Ascham upon the quondam Master of his College, whom he describes indeed as "meanelie learned himselfe", but also as "not meanelie affectioned to set forward learning in others."

University College of North Wales,
February, 1897.

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CHAPTER I.

GREEK.

No profit grows where is no pleasure ta'en:
In brief, sir, study what you most affect.
Shakespeare, *Taming of the Shrew*, Act I. Sc. 1.

ψυχῇ βίαιον οὐδὲν ἔμμονον μάθημα. Plato, *Republic*, vii. 536 E.

When Lucentio finds himself in Padua, the nursery of arts, whither he has come in order to pursue a course of learning and ingenious studies, he turns for counsel to his trusty man Tranio. The advice given by Tranio culminates in the well-known lines which head this chapter. 'The mathematics and the metaphysics' were uppermost in Tranio's mind when he thus delivered himself; and it is arithmetic, and geometry, and the studies generally which lead up to dialectic, that are present to the thoughts of the Platonic Socrates when he enunciates the closely parallel principle that 'forced growths of knowledge take no abiding root in the mind.' It is not intended here to estimate with greater exactitude, and with fuller reference to the context in the two cases, the position assumed in these passages, nor to discuss on its merits the question of freedom of choice in the earlier and the later years of study. It is enough that all will allow, first, that a time comes sooner or

later when the learner should follow his own bent, and, secondly, that in the years which precede the granting of this option, it is better to allure, than to drive, into the paths of study.

Nor again—to deal still further in negations—is it intended to estimate the comparative advantages of beginning Greek at an early or at a somewhat later age. If the remarks which follow may seem sometimes to apply better to older than to younger students, it is because the writer's experience has lain chiefly among the former. The late beginners have always been a large body in the Scottish Universities; they are to be found, too, in considerable numbers in our Provincial Colleges and our newer Boys' Schools, and among the girls trained in High Schools. As far as Greek represents with them a deliberate choice made at a time when they are of age to judge, the results attained should be good, provided always (1) that they have previously received a thorough training in English, and in the elements of Latin and of one or more of the continental languages, and (2) that they are allowed to devote an adequate amount of time to the study when once they begin it.

We will, accordingly, premise that the beginner is of any age from 14 onward: that he is able to give a large share of his time to the subject: that he has been well grounded in his own language, in Latin, and in one or more of the languages of the Continent. Such a learner, if he is in earnest and possesses fair abilities, may be expected to make rapid progress. Considerable difficulty will no doubt be presented by the grammar, especially by the accidence, and in the accidence especially by the irregular verbs. But the teacher, starting with a Greek-English and English-Greek Exercise Book, in which the simpler grammatical forms and rules are given, will push forward as quickly as possible to the reading of authors. He will feel that translation is the best guide to translation, and that grammar is best studied theoretically after it has been learnt practically.

The wise saws quoted at the commencement may now be reinforced by a modern instance. Not long ago a striking address was delivered at St Andrews by the Marquis of Dufferin as Lord Rector of the University. In drawing from his own long and varied experience hints for the guidance of the students who were his hearers, Lord Dufferin was led to look back upon the classical training which he had received at school and at the University. 'I myself was introduced to the Latin grammar when I was six years old, and to the Greek grammar a couple of years later; and when I left Oxford, after 14 years of uninterrupted application at these two tongues, the most that I could do was to translate with some sort of decency a few Greek plays, some books of Herodotus, a little of Cicero, and some Virgil and Horace, that had already been carefully conned[1].' This disproportion between labour and acquisition was to be noticed, we are further told, not only in the speaker but in the great majority of his contemporaries. The instance seems, therefore, to be 'modern' in Shakespeare's sense no less than in our own.

Fortunately Lord Dufferin, who thus indicts from his own experience the system under which he was educated, also appeals to his own experience in support of what he regards as a better method. 'Later in life I reflected with shame on the paucity of my classical acquirements, and I set myself down to learn Greek in the same way as I would set about learning a modern language (viz. by devoting more attention to translation than to grammar). The result was that, although I had only spare moments of time to give to the business, I soon found myself able to take up any ordinary Greek poet or prose writer, and read what was written as easily as I could French—always, of course, excepting a corrupt chorus or some of the more difficult

[1] *Rectorial Addresses delivered at the University of St Andrews*, edited by William Knight, p. 339.

authors[1].' The comparative failure of the old system is attributed by its assailant to the fact that, instead of encouraging wide reading with a view to the acquisition of a vocabulary, it killed interest by its excessive devotion to grammatical analysis. Classical authors were to be read, it seemed, not because they had stories to tell or beauties to unfold, but because they had grammatical rules to illustrate.

Now the force of this criticism might, it is true, be questioned to some extent by a defender of the system attacked. It might be urged that boys are not men, and that consequently the methods of later life may not be suitable for them. Or stress might be laid on the difficulties which would attend the teaching of a large class, consisting of lazy and dull as well as of bright and industrious boys, if discursive reading were substituted for strict verbal analysis. But there is less reason to dwell on these considerations, forgotten though they often are by critics of their schooldays, because this paper, as already stated, is intended more especially to deal with learners who are not very young, who have had some previous training in the grammar of other languages, and who are supposed to study Greek of deliberate choice and because they like it. In the case of such students the observations of Lord Dufferin are, in the judgment of the present writer at any rate, of great importance, even when all due allowance has been made for what may on any ground seem exceptional in the personal experiences which prompted them. In particular, as small a portion as possible of the best Greek literature should be subjected to mere grammatical dissection.

Let us suppose, then, that a learner of the type indicated is beginning Greek. What in broad outline will be his course?

[1] *Rectorial Addresses delivered at the University of St Andrews*, edited by William Knight, p. 340.

He would, as we have said, begin with Exercises, Greek into English and English into Greek. He would thus be practised, from the start, in double translation. The choice of exercise-book would be a matter for the teacher's taste. But attention may be called to one or two features of importance not always found in books for beginners. It seems desirable that the simpler verbal forms should be given as soon as possible, so that there may be greater variety in the structure of the sentences set. Rarer forms, such as the dual in nouns and verbs, may be reserved for separate treatment at a later stage. Great pains should be taken to keep the learner on the alert by the repetition, at frequent intervals and under different guises, of any points (the construction of neuter plural nominative with singular verb, for example) which are apt to find him nodding. New words should be shown, wherever possible, to be related to the words the learner already knows in English or in other languages. The connexion is often far too remote in appearance to attract the beginner's attention, and unless pointed out at first, it is perhaps never noticed at all. Many men of good abilities who have done some amount of Greek would be at a loss if asked to give the etymology of *anecdote*, *hermit*, *acrobat*, *dropsy*; and yet the original Greek words are, in these cases, familiar enough. The results would probably be still more disappointing were the derivation required in the case of such words as *diphtheria*, *proboscis*, *intoxicate*, *anodyne*, *iconoclast*.

Exercises.

Though he should postpone the systematic study of Greek grammar to a later period when he is more amply furnished with the materials for it, it will be well for the learner, almost from the beginning, to become accustomed to the use of some Primer of Greek Accidence which gives the principal Attic forms, and which contains nothing that it will afterwards be necessary to unlearn. Even the most retentive memory is helped by the

Accidence and Easy Translation.

appearance of a familiar page, and the exercise-book, which can only present the grammar in a fragmentary form, is likely to be discarded when it has served its immediate purpose. An early beginning will also be made with simple passages of continuous prose for translation into English. The fullest help may be given in the preparation of the translation; there is no reason to fear that the learner will not at a later time find difficulties enough and mental training enough, and the chief object at the moment is to quicken interest and to increase the stock of words. Short texts with vocabularies appended will be found useful, and the learner should see to it that every fresh bit of reading undertaken contributes towards that *copia verborum* which it must be his aim to attain. At the same time he should not be too anxious to carry everything away with him. A difficult word, though it may not easily be committed to memory when first encountered, will gradually fix itself in the mind, since it will present itself, time after time, in fresh contexts if sufficient ground be covered.

Xenophon.

The passages first read may happen to be portions of Xenophon's *Anabasis*. But even if this is not so, it will not be long before the learner will begin the time-honoured marches which successive generations of schoolboys have shared, parasang upon parasang, chapter upon chapter, with the soldiers of Xenophon. Only, let him not start with the fear that he will faint on the way, and that he can never hope to catch a glimpse of the distant sea and hail it with delight. The teacher will use his best endeavours to stimulate him by making the life and writings of Xenophon real to him. He will sketch the youth spent in the eager search for truth under the guidance of Socrates, the manhood of military adventure, the later years passed in retirement by a country gentleman, fond alike of field-sports and of the writing of books. He will just hint at the character of some of the books written then or earlier: the *Memorabilia*, those

unpretending but invaluable records of the everyday life and conversation of Socrates; the *Cyropaedia*, that account of the boyhood of Cyrus the Elder which, owing to the somewhat imaginary nature of its framework, may be regarded perhaps as the earliest of European romances; and the *Hellenica*, our principal authority for long and important periods of Greek history.

Story of the Anabasis.

With regard to the *Anabasis* itself fuller details may be given. A specially enlarged map, kept always before the pupil's eyes, will show in one colour the route of the march inland (the *Anabasis* proper), and in another the route taken from the interior to the coast. Inserted plans will also illustrate such points as the disposition of the forces on both sides at the battle of Cunaxa, the forcing of the Carduchian Pass, and the crossing of the Centrites. A table may further be prepared indicating briefly the contents of the various books and the precise months which they cover in the years 401—399 B.C., and containing some estimate of the distances traversed by the troops. Points to be dealt with orally will be such as the contrast between the Greek and the Persian character, the striking description given at the end of Book II of the characteristics of the Greek generals seized by Tissaphernes, and the historical importance of the expedition as an episode in the long-enduring strife of East and West, and as a proof (afterwards to be still further confirmed) that the Great King could with impunity be mocked 'at his very palace-gates.' Some notice too will be claimed by minor matters, for example by the names of places or rivers passed (two of them destined to leave their mark on modern speech in the words 'solecism' and 'meander'), and by the fortunes of the two deserted cities, Larissa and Mespila, which are supposed to be identical with the ancient Calah and Nineveh, in which case their history is better known to us than it could be to Xenophon himself. Reference might also be made to modern

descriptions of the country of the *Anabasis* by travellers or explorers such as Ainsworth, Curzon, Chesney, or Mrs Bishop; to the estimates of Xenophon and his *Anabasis* by judges so various as Roger Ascham and Heine, Francis Bacon and Taine; and to the curious fate which has made the *Anabasis* of Xenophon and the *Gallic War* of Caesar play so large a part in the education of the modern schoolboy. In any way and in every way the interest of the learner should be sufficiently excited to carry him at least to the end of the Fourth Book. It was for the 700 miles or so from the River Zab to Trapezus (Trebizond) that the endurance of the Ten Thousand Greeks was put to the severest test: they had to fight their way through an enemy's country in the winter. It is in Book IV that the interest of the narrative reaches its climax. When the Book opens the prospects of the Greeks are at their gloomiest, but when it closes they have crossed the Centrites, have passed safely through the snows of Armenia, have ascended the heights from which they gain their first welcome view of the sea, and are feasting, offering sacrifice, and making merry on the shores of the Euxine[1].

Editions and Translations.

If the narrative has been read with real zest and attention, much linguistic knowledge will have been unconsciously absorbed, more especially if the ground has been covered not once only but twice or thrice. And here a word may fitly be said as to editions and as to the use of translations. It is well that, whatever he may be reading, the student should possess not only an edition containing grammatical and other illustrative matter, but also a plain text. In the former he may underline

[1] The *Anabasis*, as a book for beginners, has been admirably treated in the United States. We may specially mention White and Morgan's *Illustrated Dictionary to Xenophon's Anabasis*, and two editions of *Books I—IV*, the one by Goodwin and White, and the other by Kelsey and Zenos. The latter contains plans such as those named above.

his difficulties if he pleases; the latter he should reserve for the rapid and pleasurable reading, *as a connected whole*, of portions already prepared. Upon the question of the use of translations opinions are sure to differ widely, but the teacher will do well to express his own view, whatever it may be, with the utmost frankness. The whole tone of work is apt to suffer if knowledge is approached by secret and half-forbidden avenues. The evil must be recognised, regulated, and minimised; stamped out altogether it can hardly be. And indeed is it wholly an evil? Is it not rather the case that, given the earnest students here presupposed, translations ought not to be put entirely under a ban? The traditional objections seem, if analysed, to resolve themselves into two, and to refer to the use of bad translations and the abuse of good translations. With regard to the first point, it is well known that there exist to-day translations of quite a different order from the 'cribs' of a generation ago. Bald word-for-word versions, containing many slips and blunders, have been largely replaced by accurate renderings possessing a high degree of literary excellence. A more serious point is the second, that of the risk of good translations being abused. But that is a risk to which all good things are exposed; and it seems best to face it from the first. The learner may be told of the best translation available (one which will be found, perhaps, in the School or College Library), but he should be warned, if he uses it at all, not to use it simply in order to save labour and thought. He must be given distinctly to understand that if he never puzzles out his author's meaning without extraneous aid, he will never be able to translate with accuracy at sight. In the long run you cannot save a youth from himself; if he does not use a translation, he will get help from a class-mate or from an edition which gives a large amount of translation in the form of notes. He must, therefore, be made to feel that he has reached the age at which he has his fate in his own hands; and

if only he does his best to make out the meaning of the passage for himself with no other aid than that of the grammar and the dictionary, it seems a matter for his own choice whether he learns the right rendering from his teacher's lips or from a printed translation, provided that the latter is used without dishonesty or concealment[1]. On the final revision of his work, at all events, he may find that difficulties have been left unsolved, and as it is of the utmost importance that he should not remain in doubt of the correct rendering, why should not he consult Jebb's *Sophocles* or Butcher and Lang's *Odyssey?* In the case of the private student the argument is, of course, of double force; but in the case of students whose need is not so great, a vigilant teacher will be able to detect abuse and to guard against it. Frequent questioning, the request for parsing or a literal version, composition exercises, practice in translation at sight, will all show whether honest work is being done. On these points, and others, a word or two may now be said.

Translation Lessons.

A few general remarks of a somewhat obvious nature may first be offered with regard to lessons in translation. The same ground should, to recur to a point already raised, be traversed repeatedly. Wearisome though the repetition may sometimes be to the teacher, it is most salutary to the average learner. The prepared translation may with advantage be done twice over, and also revised rapidly, as a whole, in texts free from underlining and from footnotes. It will be well for the student to read aloud the Greek when translating it, and for the teacher similarly to read it, and to deliver his own translation with

[1] A really serious objection, however, from the schoolmaster's point of view, is that much of the freshness of the class-lesson may be impaired by the use of translations. The objection applies, in almost equal measure, to those annotated editions which, with misplaced zeal, leave hardly a single point unexplained. Why do not school editors sometimes suggest questions instead of always forestalling them?

care and effect, couching his version in the best language he can command. At the later stages time may not allow of all this, but the value of the intelligent and expressive recitation of passages of poetry and oratory can hardly be over-estimated, and its neglect is one of the chief defects of English schools. The teacher will set his face against all mechanical reading, and will constantly be asking individual members of his class the old question: *ἆρά γε γινώσκεις ἃ ἀναγινώσκεις;*

Private Reading.

But although it is important in the highest degree, it is not enough that a small amount should be most minutely done. If sufficient leisure for independent work is allowed, wider and more discursive private reading should also be encouraged, particularly perhaps the study of some one author as a whole, with special attention to the pervading spirit and the permanent value of his writings. Such reading may not always win marks in an examination, but the boy who estimates examinations at their real worth as a means and not as an end will not heed that. He will read, and read, and read. And after he has become well versed in the Attic forms, he will be in a position to enjoy writers in other dialects; and if here again his reading is wide, his teacher will be able to help him to take a more or less comprehensive survey of the Greek Dialects, and to do this (let us hope) without spoiling his pure and unsophisticated delight in the stirring tales of Homer and Herodotus. Let Homer and Herodotus be imbibed not sip by sip but in copious draughts, and at the same time let no narrow bounds, illiberally drawn, exclude later writers, such as the less-known Attic Orators or Polybius, Plutarch or Lucian, from the catholic sympathies of the young lover of Greek literature.

We pass to another point. To help the industrious and to convict the lazy, 'unseen' translation should be required almost from the beginning. This translation may be done in

class, either orally or in writing, either without or (in the case of young students) with a dictionary. An oral lesson in translation at sight will be of great value if the teacher does his best to put himself in the learner's place. If he has taught him from the beginning, he will know pretty well what his stock of knowledge is, and he will encourage him to call every particle of it into play. He will lead the members of his class on from point to point, and will show how *they* with *their* knowledge can grapple with the passage, if only they will attend carefully to the order and construction of the words, and keep an open mind instead of hurrying precipitately to conclusions. Progress will be slow at first, but speed will come with practice and increased knowledge on the pupil's part. And practice will be plentiful where the pupil is wise enough to treat his daily preparation as 'unseen,' and to mistrust all short cuts and royal roads to knowledge.

Translation at Sight.

The next question is that of the teaching of systematic grammar. Grammar, treated in a broad and philosophic spirit, is a study which must necessarily come late, since it deserves in some degree the title of 'the coping-stone of the house of learning' which an old scholar borrows from Plato in order to describe it[1]. Goodwin's larger work on the *Greek Moods and Tenses* is a fine example of the contributions made by modern scholarship to the higher grammar, contributions in which America has the distinction of being represented by Gildersleeve as well as by Goodwin. The study of comparative grammar may be aided by the use of Sonnenschein's *Parallel Grammar Series*, of Victor Henry's *Précis de grammaire comparée du grec et du latin*, of pioneer work such as the *Greek Syntax* by Clyde and that by Farrar, and of broadsheets such as Smith and Blackwell's *Parallel Syntax Chart*. Comparative philology will furnish help in many

Grammar.

[1] Plato, *Rep.*, 534 E, where the reference is to Dialectic.

directions, and students of Greek will have had the advantage of a sound grammatical discipline when learning Latin[1]. One thing in grammar is absolutely indispensable, and that is continual examination, both oral and written. That learner is well advised who acts as his own chief questioner, and who prepares lists of difficult forms as they occur in his reading and collects for himself illustrations of the chief laws of syntax. But his teacher can also help him, and the grammar paper may, if drafted on broad lines, be as interesting as any, especially if the framer of it is at liberty to assume a good basis not only of Latin, but of English, French, and possibly German. Critical and miscellaneous questions will also form a useful adjunct to the grammar paper.

We come now to the practice of translation into Greek, which in various ways will have been proceeding all the time. We will assume that some sort of vocabulary has been already gained in the ordinary course of reading authors and writing exercises. Something more systematic might now be attempted. A book of vocabularies (words arranged in groups according to meaning) might be used for class repetition, the whole being gone over in one year and revised in the next. The words may be asked for occasionally in the shape of complete sentences devised by the teacher at the time after the manner of the *Extemporalia* of the German schools. Any interesting associations which may help to fix the meaning of a new word, and to make the act of remembering it as little mechanical as possible, will be mentioned. The word καπνός happens to meet the eye and may serve as an example. Its etymological connexion with the Latin *vapor* may be investigated; or a literary illustration will help to the same end. The learner will probably have read Charles Kingsley's *Westward Ho!* and he may be reminded of the

Formation of Vocabulary.

[1] Latin has been, by the Germans, well termed *der grammatische Knecht.*

reference there made to that 'misocapnic' monarch King James the First of England and his *Counterblast to Tobacco.* Or he may know something of the times of Erasmus, and may remember frequent mention of the Hebrew scholar Reuchlin under the designation *Capnio*, fancifully suggested by the German word *Rauch*, just as the English Bullock and Fisher were *Bovillus* and *Piscator* to their learned friends, and just as Desiderius Erasmus himself carried about with him throughout life somewhat unhappy Latin and Greek equivalents for his Dutch name, Gerard. In the same way let the teacher make the most of any traces in other languages of such words as ῥίζα, ῥάχις, πλακοῦς; of the nice distinctions in which Greek abounds, e.g. between φιλέω, ἐράω, στέργω, ἀγαπάω, or between the active voice and the middle in so many words; of the somewhat rare descriptive words, such as δασύπους, φερέοικος, ἀνθεμουργός, πέντοζος; of other names, for bird or beast or creeping thing, which might be rooted in the memory by reference to lines taken not from Hesiod or Æschylus but from Homer, who draws his similes from creatures as far apart as the wolf and the fly, the lion and the vulture, the horse and the bat, the swan and the grasshopper, the dog and the wasp, the locust and the crane, the falcon and the ass, the sea-mew and the serpent, the dolphin and the nightingale; of proverbs such as γλαῦκ' εἰς Ἀθήνας, πλύνειν πλίνθον, and ἥλῳ ὁ ἥλος; of words with historical or geographical associations, e.g. κόθορνος, κοπίς, κασσίτερος; of terms specially affected by writers on law or philosophy or rhetoric; of the verbal outfit demanded by the calling of the builder, the farmer, or the skipper; of familiar passages from the New Testament (a knowledge of which should be assumed by classical teachers more frequently than it is) such as ὁ νόμος παιδαγωγὸς ἡμῶν γέγονεν εἰς Χριστόν; and of any parallel words or expressions occurring in English authors, for example εὐήθης might be illustrated by 'the *seely* children lying in their beds' (used by Holinshed of the Princes in the Tower),

ἰδιώτης by 'humility is a duty in great ones as well as in *idiots*' (Jeremy Taylor), ἀκούειν κακῶς by 'what more national corruption for which England *hears ill* abroad than household gluttony?' (Milton). No doubt there is danger, in all this, of undue discursiveness. But some latitude may be allowed where thorough home preparation is the order of the day, and the teacher must solve for himself the problem of interest without laxity, of drill without dulness. For the acquisition of a vocabulary, in particular, his watchwords will be *interest*, *association*, *repetition*. The more modern the associations the better, for in small ways as well as in great we must seek to emphasize the continuity of human life and study. The suggested *Extemporalia* will be found especially valuable as teaching quickness, the power of turning all one's knowledge to account, and the habit of class-cooperation. Our desire throughout will be to make our pupils feel in regard to each single word that it is a living organism, and that they should aim at following its life-history and that of its congeners with all the zeal of biologists.

Each teacher will have views of his own as to the best way of teaching Greek Prose Composition, but all will be agreed as to its paramount importance as a mental training, and particularly as a means of imparting accuracy and developing taste. Perhaps no very novel suggestion as to method can be offered here, except that retranslation might be practised more extensively than at present, and retranslation not only from English, but from Latin, French, German, and Welsh (with special attention in each case to differences of order, emphasis, and idiom), as far as these languages are known to the learner. One great advantage of retranslation is that a piece of authentic Greek can in the end be put into the hands of the student for him to learn by heart. In this way attention to minute points of scholarship will be stimulated, and translation will become

Prose Composition. Dialogues. Pronunciation.

more exact and appreciative. Passages of dialogue will be specially useful, for they will suggest in a lively way that Greek was in very deed a spoken language, and that the relation between the spoken and the written language was unusually close. Anything will be a great gain which helps the student to *feel* the language, especially on its more delicate sides—the particles for example, and the prepositions; or to put the same thing in other words, the habit, once formed, of reading by the inward ear as well as by the eye will make a wonderful difference in the pupil's appreciation and progress. With the same end in view some attention should be given to the vexed question of pronunciation, in which reasonable reforms of the prevailing English practice might be introduced, with great advantage everywhere and not least in Wales, where boys are often taught to mispronounce Greek after the English fashion, when in many cases their Welsh instincts would have led them right. A habit of Greek dictation, at first of familiar and afterwards of unfamiliar passages, will test the knowledge of the revised pronunciation, and can also be made (though here the modern voice will scarcely help) an exercise in accentuation, the chief rules of which should previously be explained. Similarly, in the case of prepared translation, advanced students may occasionally read over the Greek instead of rendering it into English. Provided only that expressive reading is insisted upon, the teacher will soon see whether his pupil 'understands what he reads'; and if a faltering tone suggests a doubt, a question or two will make the matter clear. Continuous passages of original English for translation into Greek will also be prescribed, as well as occasional essays, in Greek or English, on topics with which the pupil is known to be familiar; the constructive as well as the more analytical treatment of words will be encouraged. A demonstrative lesson in Greek Prose Composition (as the term is commonly understood) will, now and again, be useful. The teacher will take

the English passage in hand, strike beneath the surface of its wording, clear away ambiguities and excrescences, simplify it, re-cast it, show where mistakes in syntax or in idiom are likely to be made, give hints upon the order of words and clauses and upon the choice of appropriate language, and reproduce (as far as he is able) the whole tone and effect in Greek. He will counsel his pupil to pay attention to the individual characteristics of authors, so that he may read with increased appreciation; and he will himself help by framing exercises on the model of work lately done. He will urge upon him the importance of such points of detail as the use of the Greek-English rather than the English-Greek lexicon, reminding him once more that the shortest paths are not always the best. He will also advise him to cultivate the power of doing his exercises, when necessary, without external help of any kind, whether derived from books or from any other source.

Verse Composition and Repetition.

Verse composition (in iambic, trochaic, dactylic, anapaestic, and other rhythms) will probably in the future be more and more confined to those who show special aptitude for it. At the same time it seems desirable that elementary exercises in metre (in iambics and hexameters, at any rate) should be given to all, if only to promote accuracy and enjoyment in the reading of the tragic and epic poets; while of finished scholarship sound metrical knowledge will always be a prime essential. Translations from Greek into English verse may occasionally be invited, but (as already hinted) the best course of all will be to allow time for the learning by heart of passages likely to strike the imagination of boys and to dwell permanently in their memory. In the classical schools of Germany the latter part of the Sixth Book of the Iliad is commonly learnt; and other passages (such as the Swallow Song of Rhodes, the Scolion on Harmodius and Aristogeiton, Simonides' *Danae*, the monody of the youth Ion in Euripides) will either occur at once to the mind, or will

be suggested by books like E. H. C. Smith's *Select Passages from Greek and Latin Poets for Repetition*, or Wright and Abbott's *Golden Treasury of Ancient Greek Poetry*. However true it may be that the average boy is a better subject for philological than for literary instruction, there is reason to think that the love of good literature is more frequently dormant than absent, and might often be evoked if only the teacher were not so loth to evince his own enjoyment of the great books he reads with his class. It is true that schoolboys entertain a well-founded objection to any unnecessary display of emotion; it is true also that the deeper meaning of Thucydides, and even of Homer and Herodotus, is beyond them at their years. But for all that, some interest can be awakened in others, however young, if only the teacher does not entirely dissemble his own interest, and is not ashamed of showing a little generous ardour now and then as occasion prompts him.

Study of Greek Life.

In some sense all the work so far indicated may be regarded as *propaedeutic*,—as introductory to a systematic study of Greek life and thought; and the training imparted will in a great degree have missed its mark unless it leaves the pupil possessed by the desire of going further. Not that the formal discipline is not of value in and for itself; but we cannot help feeling that this may to a large extent be obtained by means of other subjects accurately and methodically taught, and that the real distinction of Greek lies in the life and literature which it embalms. Greek should thus be regarded primarily as a privilege and a delight, and only secondarily as a discipline. It is with the more important aspect of the study that we shall be occupied during the remainder of this paper, though it must be admitted that the two aspects have not been in what has preceded, and will not be in what follows, kept absolutely apart; neither in theory nor in practice is this separation desirable or possible. Broadly

speaking, however, we have been dealing with method, and we shall now deal with matter; we have been dealing with language, and we shall now deal with life. The great object of our teaching will be to make some faint semblance of the old Greek life rise before our pupils' eyes and thoughts. To approach this ideal, however remotely, will, we need not say, be the work of years both for them and for us; but there is no reason why a glimpse should not early be given of fuller and fairer visions to come, nor why stress should not from the first be laid on the intense vitality and the lasting influence of the Greek language, literature, and history.

History:—

We will first speak of the history (understanding the term in the widest sense) and of the illustrative aids which may be employed in teaching it, and we shall not shrink from detail where it may seem necessary. At every point we shall endeavour to suggest methods of appeal to the eye no less than to the ear. Happy is the pupil who makes full use both of ear and eye in his reading and in his efforts to form an image of the past.

(*a*) Geography.

Geography and topography will be our natural starting-point. Kiepert's wall-maps—*Graecia Antiqua*, *Italia Antiqua* (including *Sicilia*), *Orbis Terrarum Antiquus*—will be hung round the class-room, together with a general view of Athens from the monument of Philopappus, one or more views or models of the Acropolis and the Theseum, Burn's plan of Athens and the Piraeus, an alto-relievo model of Sicily, and Jordan and Haverfield's plan of Syracuse. Large maps showing the campaigns of Alexander and the missionary journeys of St Paul should always be within view[1]; and if we are reading the later books of

[1] Bossuet (*Panégyrique de l'Apôtre Saint Paul*) will supply an appropriate motto for the map of St Paul's Journeys: 'Il ira, cet ignorant dans l'art de bien dire, avec cette locution rude, avec cette phrase qui sent l'étranger, il ira en cette Grèce polie, la mère des philosophes et des

Herodotus, we may have a map and plans prepared to indicate the routes of the army and the fleet of Xerxes and to illustrate the battles of Thermopylae, Salamis, and Plataea[1]. Photographs of famous sites and buildings will also be welcome, e.g. Delphi, Eleusis, the Theatre of Dionysus, the Syracusan Latomiae, the Temples at Segesta and Agrigentum[2]. Interest in geography and history combined will be greatly quickened if the teacher will, from time to time, take some one country or place in which he happens himself to be specially interested, and trace out some few of its associations in ancient and in later times. Sicily, to choose a striking example, was for ages in the full current of universal history; and it is no wonder that Goethe could not, until he had visited it, understand its larger neighbour Italy[3]. The teacher will rapidly review the cycles of Sicilian history; he will single out spots, such as Palermo

orateurs, et malgré la résistance du monde, il y établira plus d'Églises, que Platon n'y a gagné de disciples par cette éloquence qu'on a crue divine.'

[1] Similarly if Thucydides is being read, it might be well to enlarge the map given in the second volume of the later German editions of Ernst Curtius' *History of Greece* ('Uebersichtskarte des attischen Küstenreiches bei dem Beginne des peloponnesischen Krieges'), or the similar map to be found in Forbes' edition of the First Book of Thucydides. Duruy and Grote will provide other aids of this kind, while Percy Gardner's *New Chapters in Greek History* will furnish an excellent plan of Olympia.

[2] Mottos might be added here again: e.g. *Delphi*, οὐ δύναμαί πω κατὰ τὸ Δελφικὸν γράμμα γνῶναι ἐμαυτόν, Plato *Phaedr.* 229 E; e caelo descendit γνῶθι σεαυτόν, Juv. *Sat.* xi. 27.—The fine photographs issued by the Hellenic Society are on sale at the gallery of the Autotype Company, 74, New Oxford Street, London. Some of Hölzel's *Historical Pictures* (issued in England by Hachette & Co.) may also be found useful, as well as Launitz' *Wandtafeln zur Veranschaulichung antiken Lebens und antiker Kunst;* but it will be well to see specimens of both sets before an order is given.

[3] *Italien ohne Sicilien macht gar kein Bild in der Seele: hier ist erst der Schlüssel zu Allem.* (Written at Palermo, 13 April, 1787. Goethe visited Italy and Sicily, but not Greece.)

and Marsala, which seem to link the present with the past. If he fail to excite interest, it will be from superabundance, not from lack, of matter. To make his remarks the more concrete, he will take any specimens he may have of the coins of the Greek Period, and will mark on an outline-map of the island the towns to which they belong. Or instead of a very large he may take a very small island (Melos, let us say), and prove that it too is not without enduring interest. He might even take dull Boeotia; and Leuctra and Chaeroneia, Thebes and Plataea, Mycalessus and Ascra, Aulis and Delium, Tanagra and Orchomenus, may be shown to possess most various and attractive Boeotian and extra-Boeotian associations.

(*b*) Great Men and Great Periods.

Historical facts may also be grouped, in occasional lessons, around *men* as well as around places. In our class-room we may have a small gallery of casts and photographs, including (say) Themistocles, Pericles, Alexander, Homer, Sophocles, Euripides, Thucydides, Socrates, Plato, Aristotle, Demosthenes. Our pupils will be warned not to believe too implicitly in the authenticity of these likenesses; but anything short of deception which makes the great men of antiquity more real to them will be so much gained. Towards this end mottos, the value of which for young learners is very great, will once more contribute[1]. Some of those whose

[1] The following references will suggest a possible motto in each case. *Themistocles.* Thucyd. I. 138. (Use may also be made of the Ἀθηναίων Πολιτεία.)—*Pericles.* Thucyd. II. 40.—*Alexander.* Arthur Penrhyn Stanley's *Jewish Church* iii. 203 (including a quotation from Hegel).—*Homer.* Keats' sonnet *On First Looking into Chapman's Homer.*—*Sophocles.* Aristoph. *Ranae* 82. Matthew Arnold, *Sonnets*, 'But be his My special thanks,' etc.—*Euripides.* Aristot. *Poetics* xiii. Elizabeth Barrett Browning, *Wine of Cyprus.*—*Thucydides.* Thucyd. I. 22. Trevelyan, *Life and Letters of Lord Macaulay*, vol. ii. (various extracts from Macaulay's diary). Lord Rosebery's *Pitt* p. 4. John Stuart Mill, *Inaugural Address at St Andrews* (People's Edition) p. 19, "In a single paragraph," etc. Special mottos may be added with reference to the Age of Pericles and the Sicilian Expedition.—*Socrates.* Plato's *Apology* xxviii., *Symposium*

names have just been given are eminent rather as narrators or delineators of Greek life than as leading actors in it. With the aid of the *Dialogues* of Plato and the *Private Orations* of Demosthenes, the *Comedies* of Aristophanes, and the *Characters* of Theophrastus, vivid pictures of the social life of the Greeks may be drawn. For the political and military history, Herodotus, Thucydides, and Xenophon, are the three great names in classical times, and the pupil must early be taught the limits of the periods for which each is the principal authority. Herodotus will form the best introduction to history, as Homer to poetry. Herodotus will kindle the historical imagination and show the charm of quaint simplicity, while Thucydides will afford an unrivalled verbal and logical discipline, and at the same time give to those who can apprehend them no obscure hints of a profound philosophy of human life. It is through Thucydides (since Aristotle belongs rather to the university than to the school) that an attempt will be made to teach that most difficult of lessons, the habit of active and independent thought.—As additional illustrative aids, to be hung on the walls of the room, may be mentioned a chart (with dates) of Greek History and Literature, and a similar chart of Universal History together with a short series of historical-geographical maps. The fact that Greek history has wider bearings in connexion with Sicily, Alexandria, Rome, and with Christianity, should be kept constantly in mind, while suggestive comparisons (such as that drawn by the late Dean

215 A. Cic. *Tusc. Disp.* V. iv. 10. Plutarch, *De Genio Socratis*, 582 B. John Stuart Mill, *Liberty*, p. 14 (People's Edition). Stanley, *Jewish Church*, iii. 200, 201. The significance of the unique succession of teacher and pupil in Socrates, Plato, Aristotle, Alexander, is well brought out in J. B. Mayor's *Sketch of Ancient Philosophy*, pp. 84, 85.—*Plato.* Rep. vi. 486 A. *θεωρία παντὸς μὲν χρόνου πάσης δὲ οὐσίας.* Epitaph on the Spirit of Plato (in the *Anthology*) translated by Shelley.—*Aristotle. νοῦς τῆς διατριβῆς* (attributed to Plato). Dante, *Inferno*, iv. 130—133.—*Demosthenes. De Corona*, § 95 *καὶ γὰρ ἄνδρα ἰδίᾳ καὶ πόλιν κοινῇ*, κ.τ.λ.

Church between Venice and Florence on the one hand and Rome and Athens on the other) will be neither neglected nor overvalued. Nor will the pupil be allowed to forget that Modern Greece has had a fascinating history of her own, clouded no doubt in these latter days by political and financial uncertainties, but still not without rays of its pristine brightness.

No survey of Greek life can be complete which does not include some account of Greek art. Photographs, obtained from Athens and Rome, will be needed, and casts will be added whenever possible. One or two specimens of ancient sculpture from the older Acropolis series will illustrate the historical development of Greek art; and others of various dates and orders may be added, e.g. groups from the frieze of the Parthenon, from the balustrade of the temple of Nicè Apteros, and from the Phigalian Marbles; the *Hermes* of Praxiteles (discovered at Olympia in 1877); the '*Otricoli*' *Zeus*; the *Laocoon* group; the *Apoxyomenos* (after Lysippus); the *Apollo Belvedere*; the *Dying Gaul*; the *Discobolos* (after Myron); and some examples of Graeco-Roman art. Apposite quotations (to serve as mottos) might be given, e.g. from Virgil *Æn.* II and Lessing's *Laocoon* in connexion with the Laocoon group, or from *Childe Harold* in connexion with the *Dying Gaul* and the *Apollo Belvedere*, or from Diodorus Siculus in connexion with the *Hermes* of Praxiteles[1]. At present, unfortunately, teachers at distant centres are driven to form, with imperfect knowledge and imperfect resources, such collections for themselves. The Council of the Hellenic Society would be adding to the great services it has already rendered to those who teach and study Greek, if it were to issue a small selection of photographs of works of Greek art,

(*c*) Art.

[1] Diod. Sic., *Bibl. Hist.*, xxvi. 1, Πραξιτέλης ὁ καταμίξας ἄκρως τοῖς λιθίνοις ἔργοις τὰ τῆς ψυχῆς πάθη.—The description of "The Belvedere Apollo" in Milman's Newdigate prize poem of that name is well-known. "For mild he seemed as in Elysian bowers," etc.

with brief notes on date, subject, place of preservation, etc. It should be added here that any senior boy who shows a decided taste for art and archaeology may be introduced to Adolf Michaelis' *Parthenon* (with Plates), and to the same author's revision of Otto Jahn's edition of a portion of Pausanias[1]. Some day perhaps he may see the Acropolis itself; the Elgin Marbles he will certainly visit when in London. Teachers who use the lantern when giving general lectures on Greek art and history will have been glad to hear of the 'Catalogue of Lantern Slides to illustrate Fyffe's History of Greece,' lately compiled by the Rev. T. Field, Headmaster of the King's School, Canterbury. And neither teacher nor pupil will willingly miss any opportunity that may occur of seeing a good modern representation of a Greek Play, at Oxford or at Cambridge, or under the open sky in the Bradfield chalk-pit.

Greek and English Literature.

The unbroken continuity of Greek influence is not simply a question of history; it is also a question of literature and language. The intimate connexion between Greek and English literature will best be made manifest if, in the higher forms of schools, the teaching of Greek and English is entrusted to one person, just as Greek and German are largely taught together in the highest classes of the German *Gymnasium*[2]. By such a teacher classical themes or classical influence will be found, to an embarrassing extent, in Milton, in Shelley and Keats, in Byron, in Tennyson and Browning, in Matthew Arnold, William

[1] *Pausaniae Descriptio Arcis Athenarum.* In usum scholarum edidit Otto Iahn. Editio altera recognita ab Adolfo Michaelis. Aucta cum aliis tabulis tum forma arcis ab J. A. Kaupert descripta. Bonnae: apud A. Marcum: MDCCCLXXX.

[2] Is there not much to be said also in favour of assigning Latin and French (and Italian, if taught in the school) to a single teacher? The lessons given by such a teacher might have a specially philological, or linguistic, cast. By his Greek-and-English colleague prominence would rather be given to the literary side of his dual subject.

Morris, and Swinburne. Imitations of classical metres will be pointed out in Tennyson, Arthur Hugh Clough, Kingsley, Longfellow[1]; and the student will be introduced to verse translations (themselves classical, in some instances) of the Greek poets. Chapman, Pope, Cowper, Worsley, Milman, Elizabeth Barrett Browning, Frere and Rogers, Calverley, are names which will readily occur to the mind. Short passages will be given for repetition together with an English or a foreign version: for example, *Iliad* viii. 542—565 and xviii. 202—331 with Tennyson's translations, *Ajax* 646—692 with Calverley's, *Iphig. in Aul.* 1211—1252 with Schiller's. In the same way a common theme treated briefly by two or more great writers might be committed to memory. If a youth were to learn by heart the description of the Sacrifice of Iphigenia

[1] *Hexameters.* Longfellow's *Evangeline*, and Clough's *Bothie of Toberna-vuolich*. Cp. also Hawtrey, 'Clearly the rest I behold of the dark-eyed sons of Achaia' etc. (quoted in Matthew Arnold's lectures *On Translating Homer*, Popular Edition, 1896, p. 79).

Elegiacs. From thy far sources, 'mid mountains airily climbing,
Pass to the rich lowland, thou busy sunny river.
Clough.

Sea that breakest for ever, that breakest and never art broken,
Like unto thine, from of old, springeth the spirit of man.
William Watson, *Hymn to the Sea.*

Alcaics. O mighty-mouth'd inventor of harmonies,
O skill'd to sing of Time or Eternity,
God-gifted organ-voice of England,
Milton, a name to resound for ages.
Tennyson.

Sapphics. Faded every violet, all the roses;
Gone the glorious promise, and the victim
Broken in this anger of Aphrodite
Yields to the victor.
Tennyson.

Hendecasyllabics. O you chorus of indolent reviewers.
Tennyson.

given by Aeschylus (*Agam.* 224—247), by Lucretius (*De Rerum Natura*, I. 83—101), and by Tennyson (*Dream of Fair Women*, lines 99—116), he would be storing splendid material for an exercise in literary appreciation when his judgment ripens. With the same object of promoting taste as well as knowledge, short papers might occasionally be set on Tennyson and the Classics, or Milton and the Classics, with reference both to verbal and to larger points[1]. In the hands of a judicious teacher the aim of all this would be anything rather than the encouragement of an undue dependence on the past—anything rather than the stifling of such originality as he might be fortunate enough to discover in a gifted pupil. The masterpieces of the past supply to the moderns a standard rather than a pattern, and English literature, happily, has no reason to feel abashed even in the presence of that of Greece. Abundant reading of Shakespeare, and of the great writers before and after his time, will, when English receives its rightful place in the school curriculum, provide any corrective that may be needed for a mischievous classicism. British literature and British art will, it is to be hoped, more and more find their inspiration in British history, when that history is more widely known and the best type of patriotic pride is more generally awakened. It is most incontrovertibly true that 'les anciens

[1] In a similar spirit the teachers of ancient Greek and those of the modern continental languages might act together, to some extent, in arranging their programme of school work. The reading of the Greek tragedians might then be accompanied (for illustration or contrast) by that of Goethe, Racine, Alfieri. The Greek and the *Latin* reading might be coordinated in the same way. Especially might great works of literary criticism, like Aristotle's *Rhetoric* and *Poetics*, be read in conjunction with any books of similar purpose in Latin, French, German and English. [Jahn's edition of the *Treatise on the Sublime* is in use in some German schools.] The more systematic study of these subjects, as well as of philosophy, philology and history, would be reserved for the University, where also the harder poets such as Pindar will be read.

sont les anciens; nous sommes les gens d'aujourd'hui.' But it does not follow that good classical teaching is incompatible with a deep interest in the present. On the contrary, the more truly the teacher himself lives in the world of to-day, the more living will the ancient world be to him. Let him only be alive at many points, and classical study is safe in his keeping. The present will vivify the past, and the past will illumine the present, in the mind of the man who fully feels that it is his privilege to teach the *Humanities*.

Later Greek.

In order to make still more patent the close connexion of Greece with modern times, it will be well to keep before the learner's eyes and mind two additional points: first, the long and chequered career of the Greek language itself, and second, the important part which prose translations from that language have played in the development of the vernacular in the British Isles and elsewhere. As illustrating the former point, typical extracts from post-classical authors will be found of service, and may be formed into a little anthology for the use of senior boys. This anthology will include specimens of such writings as those of Polybius, Plutarch, the Septuagint, Josephus, Euclid (the *Pons Asinorum* might be given), Galen, Epictetus, Marcus Aurelius, Plotinus, Longinus, the Christian Fathers, the Greek Romances. In Wales we might find room for any passages from Diodorus Siculus, Strabo, Pausanias, or Dion Cassius, which seem to refer to Celtic Britain. A prefatory note would call attention to the chief characteristics of the 'Common' Dialect and the 'Hellenistic' Dialect. Examples of Byzantine and Modern Greek might be given (with translations) from Vincent and Dickson's *Handbook to Modern Greek*, Geldart's *Guide to Modern Greek*, and Constantinides' *Neo-Hellenica*. Scraps of familiar conversation in modern Greek, invitations to dinner and replies, a review of (say) Samuel Smiles' *Self-Help* in a modern Greek newspaper, a quotation from Edmond

About's *La Grèce Contemporaine* to show how that author learnt (or thinks he learnt) Modern Greek: these things, and things like these, will bring home to all the fact that Greek is still a spoken language. The relation between the old and the modern language may be shown by means of extracts from Constantinides' Modern Greek Version of Xenophon's *Anabasis III and IV* (as edited by Professor Jebb), or from a Modern Greek commentary on the *Antigone*, the actual language of Xenophon and Sophocles being given along with the modern translation and the modern notes. Care will at the same time be taken, by means of passages of prose and poetry drawn from original writers of Modern Greek, to avoid the danger of seeming to minimise the inevitable differences between the earlier and the later stages of a language. No purism, not the most strenuous of artificial efforts, can turn back the tide of language[1].

Translations from the Greek.

A few specimen translations may also serve to bring forcibly before the mind the great part which the Greek language has played in the history of the world. The vernacular translations from the New Testament are of most importance for the purpose. Some specially familiar passage, such as the Parable of the Prodigal Son, might be given in the original Greek; in Modern Greek; in Latin (from the Vulgate); in Italian, Spanish, Portuguese, French, Rouman; in English, German, Dutch, Flemish, Dano-Norwegian; and in Welsh. Examples might be added of versions earlier than the 'authorised' or standard ones—of the pre-Lutheran translations in German, of John Wycliffe's and Miles Coverdale's and William Tyndale's in English, of Wil-

[1] In the matter of vocabulary no better guide will be found than the *Modern Greek Dictionary* recently edited by Dr A. N. Jannaris, who has devised a convenient method of distinguishing words which are (1) colloquial only, (2) both literary and colloquial, (3) preserved from classical times, (4) too learned or archaistic.

liam Salesbury's and Bishop Morgan's in Welsh. In the same way a few excerpts might be made from early translators of Greek authors generally (e.g. Barnaby Rich's version of part of Herodotus), and from the renderings of Plutarch by Sir Thomas North (after Amyot) and by Philemon Holland. Any method which increases interest in the earlier phases of the English speech will more than justify itself, quite apart from the testimony thereby given to the universality of Greek influences and associations.—The Welsh boy may also be stimulated by reading verse translations from 'Anacreon' by Goronwy Owen, from the *Iliad* by Lewis Edwards, and from the *Alcestis* by Dewi Môn and D. E. Edwardes. The translations of the *Alcestis* here referred to are those which have been published, thanks to the liberality of the Marquis of Bute, in a separate volume by the Honourable Society of Cymmrodorion. The motto of that Society—CARED DOETH YR ENCILION—might well be inscribed over the entrance to our Greek class-room, together with a Greek iambic line to serve as an attempted rendering of it[1]. If the class-room overlooks the Menai Straits, we shall feel the present brought near to the past when we remember how vividly Tacitus has described the reception which Suetonius Paulinus met with on their banks. And as we look forward to the future we shall think of Ruskin's admiration for 'your Snowdon, and your Menai Straits, and that mighty granite rock beyond the moors of Anglesey, splendid in its heathery crest, and foot planted in the deep sea, once thought of as sacred—a divine promontory looking westward; the Holy Head or Headland, still not without awe when its red light glares first through storm'; and we shall hope that, as in Greece

[1] For example: ΤΟῪC ΓÀΡ CΟΦΟΎC ΤΟΙ ΤÁΖΊΤΗΛΑ ΔΕῖ ΦΙΛΕΙ̂Ν, or ΠΟΘΕΙΝᾺ ΤΟΙ̂C CΟΦΟΙ̂CΙ ΤÁΜΑΥΡΟΎΜΕΝΑ. The precise meaning of the word *encilion* is not easily determined, but the general drift of the maxim is clear.

so in Wales, 'these hills, these bays and blue inlets, may be always fateful in influence on the national mind.'

Conclusion. Aims and Methods of Greek Study.

A few observations may, in conclusion, be made upon the aims which should inspire both the teacher and the student of Greek. We live, happily, at a time when Hellenic studies are distinguished by their activity and their freshness. Every year which passes seems to have its record of discovery in the fields of literature, history, and archæology. Egypt sends us manuscripts, Asia Minor inscriptions and ancient remains, Crete mysterious characters; while art and music receive new light from Athens, and Olympia, and Delphi.

The materials are more abundant than ever; what is the spirit in which they are to be studied, especially by the young? Some would answer that our method should be literary, others that it should be scientific; the true ideal seems to consist in uniting the two, so far as that may lie within our power. The literary method may be said to be specially characteristic of France, the scientific of Germany. The most sensible critics in each country are naturally the most alive to the danger of a one-sided development. In France we are told that the classical teaching is apt to be slipshod; literary criticism and literary style are everything, while strict verbal accuracy is held of no account; every writer appears to think that he is addressing the general public, and is afraid that he may be accused of pedantry when he is simply proving that he possesses the scientific equipment necessary for his task. It has been said, by a scholar of eminence, that 'there is a superficiality about the products of the French genius which marks the clever but second-rate mind. Clever writers, incomparable talkers, their assertion never carries with it the weight which is derived from known habits of patient and exhaustive investigation[1].' This statement is not, we are glad to think, as true now as it was a

[1] Mark Pattison, *Suggestions on Academical Organisation*, p. 151.

generation ago; expert observers tell us that in France to-day the love of genuine learning of all kinds is rapidly spreading. But still the fact remains that the French genius has a specially literary cast. On the other hand, the complaint in Germany (especially with reference to the schools) is that the teachers are wofully narrow; they have neglected wide and liberal reading in order to devote special attention to some minute, and often very trivial, point on which they wished to write a dissertation for their degree. The work they produce is, in consequence, too often little better than an unsightly storehouse filled with the lumber of learning. And they are (so the critics tell us) no less unsuccessful with their pupils. They fail to make them feel that a great classical book—a play of Sophocles or a dialogue of Plato—is an artistic whole full of living interest, and the reason is that they do not know and feel it themselves. It is the natural tendency of the human mind to run to extremes; but our great aim and ambition ought to be to combine, as far as may be, German with French tendencies—specialism with *generalism*, minute verbal criticism with large æsthetic pleasure, philological and scientific method with literary and artistic tastes, the love of truth with the love of beauty. It follows, therefore, that in our school-teaching the two guiding thoughts will be precision and enjoyment; scientific method on the one hand, and literary and historical and artistic appreciation on the other. Which of the two aspects of study should receive the greater share of emphasis, will depend largely upon the nature and the needs of the pupil taught. Some boys are of a more exact turn of mind than others; and some too will have previously received a more exact training than others—not necessarily in the classics but in other branches of science and learning. Similarly, one will have more need of æsthetic training than another; but to all some foretaste of pleasures to come may occasionally be given, without any suspicion of that habit of 'holding forth' which boys usually and rightly dislike.

It is reasonable that such a foretaste should be given. We may all know that walking is good exercise for us; but we also like to know beforehand that the place to which we are to walk is interesting, for unless that be so we should prefer to turn our steps elsewhere. And as for the suspicion of 'holding forth,' that reproach is little likely to be incurred by the teacher who does not indulge in vague effusions, but provides preliminary surveys of the ground which have cost him time and labour. Experience proves that pupils obtain too little rather than too much of such assistance and stimulus.

Notwithstanding the gloomy predictions of cloistered pessimists, there are not wanting indications that the study of Greek will occupy an even more honoured position in the future than in the past. Its freshness is inexhaustible; and its significance is becoming more evident daily. The place of Greece in the general framework of human history appears only the more striking the more we know of the ancient Oriental world, the more deeply we study English and other modern literatures, the more comprehensively we survey the march onward of humanity. No doubt the Greek language will not in the future be forced upon the dull and unwilling to the same extent as in the past. But this is hardly a matter for unmixed regret. Even though the number of those who are taught the subject should be diminished, there will yet be compensations. There will be more of the well-equipped and earnest workers who travel far; there will be fewer of the smatterers who in the past have abandoned the study early, and have done their best to give it a bad name. The learners will be willing learners; and the pleasure of the teacher's task will be enhanced by the freedom of the pupil's choice. On his own part, the teacher will do all he can to encourage and direct a habit of good and systematic reading instead of deadening the love of reading by an excessive and unseasonable devotion to verbal analysis. Though he will be the last to undervalue that rigorous verbal training

which is the foundation of all true scholarship, he will think more of the substance than the form, of the thought than the language, of the spirit than the letter.

And let him take heed, now that liberal education is being more and more extended to the nation at large, not to make the tacit assumption that all his pupils come from circles in which there is a family tradition of polite knowledge. Many a graduate fresh from a cultivated home and from one of the great universities has failed as a teacher at the more popular centres because he has not realised this fact. If, therefore, the present paper should appear to any reader to run into excessive detail, he should at least remember that it is specific with a purpose. The writer of it has often, in reading essays of the kind, thought, whether rightly or wrongly, that for the needs of our own day they dealt too much in generalities, and that by the omission of cumbersome particulars they lost in practical helpfulness what they gained in literary form. It seems better that detailed suggestions should be offered, even at the risk of giving rise to more dissent than concurrence. They will have served a useful purpose if they do no more than stimulate thought in matters in which the deadening influence of mere routine is too often felt.

But though it is true that traditions of learning do not exist in ordinary English homes, our pupils must not be allowed to forget that in the history of the English people there may be traced, outside the limited class of professed scholars, a long and inspiring tradition of the study of Greek, both among men and women. Among women we need only refer to George Eliot and Mrs Browning in our own times, and then carry our minds back to the days when Roger Ascham found the ill-fated Lady Jane Grey "in her chamber reading 'Phaedo Platonis' in Greek, and that with as much delight as some gentlemen would read a merry tale in Boccace[1]"; or when Erasmus gave

[1] Roger Ascham, *Schoolmaster*, Book I.

weighty counsel to Margaret Roper. "You are an elegant Latinist, Margaret," Erasmus was pleased to say; "but if you would drink deeply of the wellsprings of wisdom, apply to Greek. The Latins have only shallow rivulets; the Greeks copious rivers, running over sands of gold[1]." For the benefit of the youths, Lord Dufferin's example already mentioned may be again called to mind, and we may couple with it that of the Bayard of the Civil War, Lord Falkland, remembering as we refer once more to a titled name that a noble study which once was largely confined to men of noble birth is now within the reach of the poorest commoner in the realm. "He was constant and pertinacious in whatsoever he resolved to do, and not to be wearied by any pains that were necessary to that end. And therefore having once resolved not to see London, which he loved above all places, till he had perfectly learned the Greek tongue, he went to his own house in the country, and pursued it with that indefatigable industry, that it will not be believed in how short a time he was master of it, and accurately read all the Greek historians[2]." Such industry and determination are invincible; wherever they are found, in rich or poor, in young or old, they are the learner's strongest stay and the teacher's best ally.

[1] *The Household of Sir Thomas More*, p. 91 (W. H. Hutton's edition, 1896). It is permissible, perhaps, to quote from this attractive narrative as though it were historical.

[2] Clarendon, *History of the Rebellion*, ii. 351. It will be remembered that Hobbes of Malmesbury translated Thucydides early in the seventeenth century. The shadow of the coming War may have lent a mournful interest to the records of intestine strife which fill the pages of the Greek historians.

NOTES WITH SPECIAL REFERENCE TO WALES.

A few supplementary notes, too detailed for previous presentation, may be added here. It seems eminently desirable that schools everywhere (and not least in those remote districts of Wales in which many of the writer's former pupils are now teaching) should have a small library and museum of their own in order to provide illustration, however slight, under the following heads: (a) Local antiquities, local romance, local history; of all these there is in Wales a rich mine. (b) English history. (c) European history and literature (tables of dates; historical-geographical maps, etc.). (d) Palestine. (e) Greece and Rome. (f) Art of the world (architecture, sculpture, painting). Similar collections, on the side of physical science, will no doubt be suggested by other contributors to this volume. It would be a great advantage if all students of language and literature had, when young, cultivated their powers of observation by practical work in connexion with one or more of the natural sciences.

Library and Museum.

With regard to the elements of a Greek Museum something has been already said; and such additions will readily occur to the mind as facsimiles of manuscripts and inscriptions, copies of the newly-discovered Hymns to Apollo, adumbrations of pictures or cartoons by Turner or Raphael, outline-drawings of Flaxman's designs, photographs of Tanagra statuettes, etc. Other additions still will be suggested not only by foreign travel, but by a visit to the British Museum, or to the collection of casts from the antique at South Kensington, or to the Teachers' Guild Educational Museum in Gower Street.—Small but important points of detail, to be con-

sidered in the planning of new schools, are the amount of wall-space available for hanging pictures, etc., and the provision of a continuous 'blackboard' running round the room from end to end. For the latter purpose slate would naturally be used in Wales.

In the library of small schools it may not be possible to obtain elaborate editions and works of reference, but illustrated books such as Anderson's editions of Schreiber's *Atlas of Classical Antiquities* and of Schreiber's *Homeric Atlas* will be of great service as bringing vividly home to the youthful mind the *Realien* of antiquity—ships, houses, weapons, etc. A valuable summary of the results of recent research in political and other antiquities will be found in Gow's *Companion to School Classics*, a volume which should always be within the young student's reach. The boys and girls to whom reference has been made as coming from non-literary homes may need to be introduced also to such books as Charles Kingsley's *Heroes* and A. J. Church's various *Stories from the Greek*, to the best translations of Homer and of Plutarch's *Lives*, and to the passages in which Milton and Macaulay describe the glories of life in Ancient Athens. And they may some day, if they show a turn for classical learning, form some estimate of the extent of this field of mental activity by a perusal of Salomon Reinach's *Manuel de Philologie Classique*, or of Hübner's *Bibliographie der classichen Alterthumswissenschaft*. At the same time their taste for fine and finished scholarship will be whetted by the study of such translations into Greek as those of Tyrrell (e.g. the rendering of 'Scots wha hae' into Alcaics), of Jebb (e.g. the Pindaric imitations), and of Arthur Sidgwick (e.g. the Greek Prose Versions given in 'Lectures on Greek Prose Composition').

Foreign texts and editions, etc.

The teacher will also recommend texts and editions for use in class, especially such as are published abroad and may therefore not be known to the learner, who may nevertheless possess enough French or German to profit by any annotations they contain and may obtain stimulus and freshness of view from the use of non-English commentaries. Such are those published by Teubner, Weidmann, Freytag, and Hachette. Of those brougth out by the last-named firm good examples are Ch. Thurot's *Épictète* (*Manuel*) and H. Weil's *Démosthène* and *Euripide*.—As to *dialogues*, original passages of ancient

Greek will be used by preference, but occasional reference may be made to Blackie's *Greek and English Dialogues* and to foreign books such as Joannides' *Sprechen Sie Attisch?*—As a guide to *pronunciation*, the pamphlet published by E. V. Arnold and R. S. Conway (under the title of *The Restored Pronunciation of Greek and Latin*) for the use of the students of the University of Wales may be consulted with advantage. In this matter the United States of America are understood to be considerably in advance of Great Britain. Indeed, the extent to which Greek studies generally are pursued and honoured by the best American universities is a pleasant sign of the times, the more so that modern languages, and physical and economic science, are not kept by them in the background, but are studied with the greatest zeal and success. American experience provides yet another proof of the fact that academical subjects act and react upon one another in the most invigorating way.

Welsh Language.

A teacher in a Welsh school or college is not likely to forget that in the case of a large proportion of his pupils Welsh, not English, is the mother-tongue. He will do his best to take advantage of the fact. He will point to Welsh words formed from the Greek (e.g. *esgob* = *ἐπίσκοπος*, cp. French *évêque*; *eglwys* = *ἐκκλησία*, cp. *église*. *Ysgol* as equivalent to both *schola* [*σχολή*] and *scala* may suggest a homily for the benefit of those whose flagging industry needs so rude a spur). He will show how far *go-* and *gor-* and *cyd-* and *dad-* and *rhag-* and *llwyr-* at the beginning of words correspond to *ὑπο-* and *ὑπερ-* and *συν-* and *ἐκ-* and *προ-* and *δια-*, and how far *γυναικάρια* corresponds to *gwrageddos* and *παιδίον* or *παιδάριον* to *bachgennyn*; how far *ὠτακουστεῖν* (a word peculiarly appropriate to Hieron's eavesdroppers at Syracuse) finds its equivalent in *clustymwrandaw*, and how far *clywed* (in the sense of 'perceive' as well as of 'hear') is to be compared with *κλύειν*, and *gwr*)(*dyn* with *ἀνήρ*)(*ἄνθρωπος*. He will point out that some Greek words have, as far as meaning goes, nearer counterparts in Welsh than any which English can supply (e.g. *ὄψον* = *enllyn*; Scotch, *kitchen*[1]); he will show that

[1] "What is eat by way of relish to dry bread is called *kitchen* in Scotland, as cheese, dried fish, or the like relishing morsels." Sir Walter Scott, *Pirate*, c. xi. (foot-note at end).

this is true of some forms also (e.g. *athronyddu* = φιλοσοφεῖν, *bugeilio* = ποιμαίνειν, *prydyddu* = ποιεῖν—not to speak of quasi-dual forms such as *deulin* and *dwyfron*); he will illustrate, as far as it can be done, the Middle Voice by means of *ym-*, and the use of οὐ and μή by *ni* and *na*; he will try to find Welsh examples of 'accusative of respect' and of 'impersonal construction'; and he will indicate any parallelism in proverbs (e.g. *nes penelin nag arddwrn* = ἀπωτέρω ἢ γόνυ κνήμη, Theocr. xvi. 18; and *nid twyll twyllo twyllwr* = the Byzantine proverb ἀπὸ κλέπτου κλέψον καὶ κρίμα οὐκ ἔχεις)[1]. He might also give instances in which Welsh translates the Greek more closely than English does, e.g. *Ac amryw rai a lefent amryw beth yn y dyrfa* (Acts xxi. 34, ἄλλοι δὲ ἄλλο τι ἐπεφώνουν ἐν τῷ ὄχλῳ); or in which a single word in Welsh, as against a number in English, is used to render a Greek expression (e.g. Ἐκριζώθητι, St Luke xvii. 6. Welsh, *Ymddadwreiddia. A. V.* seven words, 'Be thou plucked up by the root.' *Rev. V.* four words, 'Be thou rooted up'); or in which the convenient *yntau*, *hithau*, *ninnau*, etc., can give a shade of emphasis or contrast, such as that of μέν and δέ.

Welsh can often keep quite close to the order of the Greek. Two illustrations may be offered, the original Greek being taken in the one case from the New Testament, in the other from Plato. In St John xvii. 9, where the Greek has οὐ περὶ τοῦ κόσμου ἐρωτῶ, ἀλλὰ περὶ ὧν δέδωκάς μοι, ὅτι σοί εἰσιν, the Welsh gives *Nid dros y byd yr wyf yn gweddio, ond dros y rhai a roddaist i mi; canys eiddot ti ydynt.* Towards the end of the *Apology* we have the words καὶ ἐὰν ταῦτα ποιῆτε, δίκαια πεπονθὼς ἐγὼ ἔσομαι ὑφ' ὑμῶν, αὐτός τε καὶ οἱ υἱεῖς. Here again we can, when translating into Welsh, keep much nearer to the Greek order, than would be possible in English without baldness and ambiguity: *Ac os hyn a wnewch, yr hyn sydd gyfiawn fyddaf fi wedi ei dderbyn oddiar eich llaw, myfi a'm meibion.*

[1] The list might easily be extended, e.g. ἐν τυφλῶν πόλει γλαμυρὸς βασιλεύει = *unllygeidiog fydd frenin yng ngwlad y deillion*; κεραμεὺς κεραμεῖ κοτέει = *mal dau eurych*; μηδὲν ἄγαν = *nid da rhy o ddim*; ἀρχὴ ἥμισυ παντός = *deuparth gwaith ei ddechreu*; τοὐμὸν ὄνειρον ἐμοί = *ac yna mi a ddeffroais.*

Few things would be more likely to give additional life to the study of Greek in Wales than that there should be offered, in connexion with the Welsh University, scholarships which should provide for the best graduates in classics a course of instruction at the British School of Archæology at Athens for a year or two, after which they would return to Wales, as teachers, with their zeal rekindled at the old altars of the Hellenic race. Some provision of the kind is already made in the case of the German *Stipendiaten* and of the students of the French *École Normale.* Athens would thus once more become, in some sort, a University for the West, a Celtic West whose dim and shadowy outline first rises above the horizon of the recorded centuries in the shape of those *Cassiterides* which to the early Greek historian seemed to lie in a region distant and unknown.

Welsh University Scholarships.

CHAPTER II.

LATIN.

Latin common to both Classical and Modern side.

THE contest between the Modern and Classical systems of Education has issued in a compromise. A *modus vivendi* has been arrived at, whereby the two exist side by side in most English secondary schools. There has been give and take on both sides. The realists learn something of the humanities, the humanists learn something about the world of Nature, and the boys of England nourish their youth sublime on 'the fairy tales of Science' as well as 'the long results of time.' This result was indeed inevitable from the first. A curriculum which was fixed in the days of Erasmus had to be remodelled in the days of Darwin. Latin is one of the connecting links between the Classical and Modern side. Let it not therefore be assumed that in anything I say in praise of Latin or its educational value, I am advocating any exclusively classical system or a return to the old system of Sturm and Roger Ascham, when Latin was the be-all and the end-all here of school education. Each man, as Emerson says, is like a bit of Labrador spar. You turn it over in your hand and it seems dull, opaque and gross, until you strike a certain angle in the spar, and then your eye catches its lustre. So is it with the

schoolboy. It is the teacher's duty to turn him over until he catches his lustre, to discover his special aptitude, to find out what subject he can work at with most interest, to get at him where he is most get-at-able.

Usefulness of Latin for understanding Modern Languages

Latin has a professional value for the Clergyman, Lawyer, Doctor, Apothecary, Schoolmaster, and all students of history or archaeology. It has a value also for the Commercial man. Once he has mastered Latin, he will master French, Italian, Portuguese, Spanish, or any Modern Language of the Romance family, in a quarter of the time he would otherwise require. His grasp of these languages will be surer, his insight deeper, his power of expression far more extensive than if he had no knowledge of the language from which they are all descended.

and English words.

But more important than French or Spanish is one's mother tongue. It is impossible to thoroughly understand English, not only literary English, but the ordinary English of everyday life, without a knowledge of Latin. Thousands of derivatives come to us from Latin through Norman French, and every year the language is being replenished with new words drawn to a large extent from Latin. All these later words, which have been taken from Latin since the Revival of Learning, at once and without further consultation of the Dictionary yield up their meaning,—their full meaning with its exact shade and connotations and all its metaphorical colour—to the mind which has once acquired a fair knowledge of Latin; while to the mind which has no knowledge of Latin, however much the Dictionary be plied, they remain to the end dull and comparatively inexpressive instruments of speech.

Learning of Roots no substitute.

But it may be urged that the same purpose would be served if children were taught a certain number of Latin roots. Such was the method adopted in the Young Ladies' Academies of a past genera-

tion, and a more lifeless, barren process could not be imagined. The economy of time, if economy it be, is dearly bought when the study of a living organism, such as the Latin language, is replaced by long and arid lists of Latin roots, 'set in a note-book, conned and learned by rote.' There is as much difference between the two systems as between learning plant-life in the open field or garden and learning Botany from dried specimens and S. Kensington diagrams. The one trains the mind as a whole, the other merely overburdens one particular faculty, viz. memory, which will find otherwise quite as much work as it can manage. And when all is done, what learning of lists can teach you to recognise a root under all the many diverse forms which it assumes in such a string of words as *agent*, *action*, *exigency*, *agile*, *enact: fraction*, *infringe*, *fragment*, *frail: treat*, *abstract*, *train*, *tracery*, *trait*, *portray?* The power of seeing order in seeming disorder, of tracing one strand of meaning through a series of cognate words, is a power which makes easy the effort of memory, and economises the mind's energy, and it is a power which no learning of root-lists can infuse.

Accuracy.

Again, there is nothing more important in the ordinary business of life than accuracy of statement and of definition. No small fraction of the evils of life can be traced to inaccuracy, usually unintentional. It is the fruitful source of misunderstandings, misrepresentations and 'all those direful words which begin with the prefix *mis-*.' There is no training which is so well calculated to produce in a boy precision of thought and strict accuracy of statement as Latin. In every Latin word that he writes he can make, as a rule, three or more mistakes. Mistakes are our best teachers. And if a boy learns by his Latin mistakes to write accurate Latin sentences, he will have acquired a habit of accuracy which will stand him in good stead for anything else he has to do in life.

So much for the utilitarian value of Latin. But it is a very

narrow view of education which measures the value of an educational instrument only by such standards. It is true that we must learn how to earn a living before we can live to learn. But to every Englishman who can afford a secondary education there is more than one calling in life. There is what is called, in the narrower sense, his calling or vocation, to be a clerk, tradesman, merchant, engineer, or whatever it may be. But there is also the call to fulfil the duties of a man and citizen. And his education must fit him, not only for those hours he will spend in the shop or office, but just as much for the hours when he will be his own master, for the wise and public-spirited use of his leisure. Indeed it is more important to train a boy for his recreation than his business. In the shop or counting-house there is not much scope for individuality; all must conform more or less to type: in the hours when a man is free his personal tastes and inclinations find free scope. In business there is every incentive for him to acquire for himself the knowledge necessary for his trade, whereas for the right use of leisure careful previous training of taste is required. And the necessary training does not consist in the mere acquisition of knowledge, in the abundance of things which a man knows. The object of liberal education is to develope an instrument able to acquire knowledge for itself, to think and form correct opinions, to discriminate the good from the bad, the beautiful from the ugly. 'The best education,' says Mazzini, 'will ever be that which imparts the greatest capacity for thought'—and, one may add, 'for action.'

Latin as an element of Liberal Education.

A system which proposes to itself this end must concern itself not primarily with the study of external nature, but with the study of man, his qualities, his history, his modes of thought. Language is the instrument of thought. Therefore the study of language holds the foremost place in the scheme of Liberal

Compared with French and German as a study of language

Education. Of all languages that can be studied with a view to the formal discipline of the mind, Latin is recognised as the best. Many argue that French and German would be just as efficient, but their contention has never been practically demonstrated. The grammar and vocabulary, the spirit and expression of these languages are too like our own. Translation from, or composition in, a modern language does not compel the same effort of thought as Latin Translation or Composition. Take for example such expressions as *solidarity*, *autonomy*, *objectivity*, *materialistic*, *feelings of humanity*, *pleasures of sense.* To do these into French or German is easy. The English-French or English-German Dictionary lies close at hand and quickly furnishes correct equivalents. But the boy who has in this way produced a passable piece of French or German Composition may have at the end no more idea of what the passage means than he had to start with. Not so with Latin. '*Prudentiae voluptates*' or '*hominum sensus*' soon bewray him. He cannot possibly translate the passage into passable Latin without mastering the real meaning of each word and sentence, and the logical connexion of the piece as a whole. He is brought face to face with all the difficulties, whether of terminology or reasoning. And there is no educational exercise which is so well fitted to brace and strengthen the mental fibre, prevent mental flabbiness, and make solid the foundations of knowledge.

and of Grammar.

Again, no methodical teaching of language, no knowledge of the laws and principles which underlie and account for the speech we use, is possible without studying grammar. The first elements of grammar can and ought to be learned from the mother tongue,—the different parts of speech, numbers, genders, persons and the simple classification of sentences. But of formal grammar English has next to none; Dr Johnson was able to dismiss it in ten lines. Other modern languages have more, but the part

which entails most labour, viz. gender, is just the most irrational survival of the synthetic grammar of the past. Latin has a definite form to mark the function of each substantive in the sentence, a different mood to distinguish that which is thought from that which is stated as fact, a different construction to distinguish what is reported on the authority of another from what is stated on one's own authority. No other language marks these distinctions so clearly and visibly. It has moreover a plastic order by which it maintains the historical order of events[1] and marks the emphasis of a sentence without periphrases or italics. It is in fact unequalled as an instrument for the formal discipline of the mind. It is clear where English is obscure, direct where English is circumlocutory, restrained and simple where English is redundant, precise where English is vague, concrete where English is abstract. The very contrast of the two languages rouses attention and stimulates thought.

Suited to boys' character.

Moreover, what biologists tell us of our physical development is true also of our mental development; the history of each individual is in itself an epitome of the history of the whole species. The schoolboy between the ages of 11 and 17 is just about in the same relative stage of development as the Romans represent in the history of mankind. The Roman qualities are in many respects the best qualities of the schoolboy, a strong sense of discipline and patriotism, admiration for strength and all-round manliness, a shrewd, practical common sense intolerant of theorising, a strong feeling for the real and concrete, just awaking to the truths of generalisation and abstraction under the influence of their schoolmasters, the Greeks. And just as

[1] English "I shall go (3) to see him (4) because he came (1) to see me (2)." Latin "cum venerit (1) me visum (2), ego ibo (3) eum quoque visum (4)." I owe the example to Mr E. V. Arnold.

these characteristics are reflected in the Latin language, so the study of the Latin language will react upon the mind.

English Literature.

So much for the intrinsic merits of the language as tending to liberalise the mind. But not less important is it to learn Latin as a preparation for the study of Literature in general and of English literature in particular. A knowledge of Latin is even more necessary for the reading of good English than for the writing of good English. The standard classical authors may, it is true, be read and enjoyed by one who knows nothing of Latin; but they cannot be fully appreciated, much less can they be scientifically studied by such a person, any more than modern political institutions and state-systems can be understood without a knowledge of the Roman Empire, out of which our modern systems grew. It is hard to realise how large a portion of such authors as Milton, Sir Thomas Browne, Gray, Pope, Dryden, Burke, Johnson, Addison must remain egregiously misunderstood by, or wholly unintelligible to, those who read them without any previous knowledge of the Latin authors whose writings were the staple diet and highest model of these English writers. It is not only that such a reader will be arrested at every turn by Latin phrases and quotations which he cannot comprehend,—for these possibly some Vade-mecum might be constructed,—but the allusions, the ideas or, if not the thought itself, at any rate the form in which it is cast,—in a word, the atmosphere of their writings is something quite alien and incomprehensible to the man who has no knowledge of Latin Classics.

Training of Taste.

Teachers cannot too carefully bear in mind that the object of teaching Latin is not to produce Latin specialists or adepts in technical scholarship, but to form taste, to teach boys to admire rightly. The teaching of Latin, as of the classics generally, has been hitherto too exclusively philological. Teachers have

treated the classical authors as a sort of parade-ground for the practice of perpetual grammatical drill. Such treatment, with 99 boys out of 100, rather repels than attracts. Even from the earliest days of Caesar construe, it is the teacher's duty to see not only that his pupils understand the meaning of the great authors he has to teach, but also why and wherein they are great. Never was it more needful than in this age of sensationalism and literary dram-drinking that children should be trained to healthy taste in literature. And it is only by constant and direct association with the best models from earliest youth that correct taste can be formed. It must be mainly by the unconscious influence of environment. 'We ought,' says Plato, 'to seek out artists who by the power of their genius can trace out the nature of the fair and graceful, that our young men, dwelling, as it were, in a healthful region, may drink in good from every quarter whence any emanation from noble works may strike upon their eye or their ear, and win them imperceptibly from their earliest years into resemblance, love and harmony with the true beauty of reason.'

Roman History.

But Roman greatness does not adequately express itself in Roman poetry or *belles lettres* of any kind. It is a greatness not of intellect, nor of art, but of character. It is seen best in Roman deeds and Roman sayings. De Quincey calls attention to the grandeur of their anecdotes and serious *bons mots*, and finds in these the revelation of the Roman mind under its highest aspect, 'great in the presence of man, though mean in the presence of nature.' But more striking still are the simple clear-cut outlines of heroic figures in Roman history, supreme types of that virtue of patriotism which appeals perhaps more than any other to the boyish imagination. In no people as a whole do we find such firmness, courage, and above all such a strong sense of social obligation, as among the Romans. To the English-speaking boy especially, Roman history should be familiar from

earliest years, for nowhere else can he learn so well the sense of dignity and of command which befits an imperial people, or that subordination of the individual to the community which we call public spirit. 'Moral education,' it has been said, 'consists in making the creature practically serviceable to other creatures according to the nature of its own capacities.' Who can tell how far we are indebted to Horatius Cocles, Quintus Curtius and Decius Mus for the high tone and unselfish devotion which characterises English public men?

I make no apology for discussing at length the aims of Latin teaching, for the method of teaching must largely be conditioned by the objects aimed at: the *how* must depend largely on the *why*. Many may think that the very multiplicity of the objects to be attained must be fatal to the successful attainment of any one of them[1]. But many-sidedness, so far from being a drawback, is a necessity in any system of education for the young. The powers of memory, observation, reasoning, concentration, the faculties of taste and expression, all need to be trained together; and Latin is a splendid educational instrument just because it forms a sort of focus in which all the scattered forces of the mind converge, without any loss of intensity or of beauty in their convergence.

Method.

What is worth doing at all is worth doing well. This proverb, true of most things, is true of nothing so much as of the learning of languages. A smattering of chemistry, of geology, of botany, is always so much to the good, so much added to one's store of knowledge, so much increase in one's power of observation. But to learn the grammar of a language and to stop short of the literature is like paying up all one's insurance policies except the last, and so missing the benefit of the whole. That method therefore will, *ceteris paribus*, be the best, which most quickly introduces the learner to the Latin Literature. It is

[1] Bain, *Science of Education*, p. 382.

a great mistake to so exhaust the mind with the laborious rudiments of language that it has but little time or inclination to imbibe the lessons of Literature. It was the fashion in old days to drill boys for a year or longer in the forms of Latin Grammar before they were allowed to do the simplest exercises or translate the simplest sentences. That was a great mistake. It is like teaching people to draw by the rules of perspective, and light and shade, without allowing them to handle a pencil or giving them designs in which to study the effects. Hence the Latin Grammar in the minds of our fathers is indissolubly associated with memories of the birch.

Grammar.

> *Qui, quae, quod,*
> fetch me the rod,

says the old rhyme. 'The parts of speech are a boy's pillory,' said Martin Luther. And various schemes have been suggested by which the grammatical desert shall be made to blossom as the rose, and the spirit of heaviness be exchanged for the garment of praise.

But, disguise it how we will, there must always remain a certain amount of drudgery to be performed, a certain number of forms and rules to be memorised which seem at first useless and arbitrary. The only choice is whether it shall be done sooner or later, and any one who has seen the pain and effort which it costs a person of mature years to learn the grammar Paradigms which a boy in Eton jacket picks up with almost as much ease as he picks up the jingle of a nursery rhyme, need have no hesitation about the answer to be given. The fact is that, whatever study one takes up in life, there will be 'grammar' in some shape to be learned,—and to be learned in no other way but by drudgery. What anatomy is to the surgeon, what multiplication tables and formulae are to the

Begin young.

mathematician, what the tables of specific gravity are to the chemist, that grammar is to the student of language,—the strait gate, the narrow path through which he must enter the promised land of literature. Probably boys who complain of the drudgery of Latin Grammar, if sent to do ditch work instead, like the President of the United States in the story-books, would come back again in a day or two, as he did, and ask to return to *mensa*, *amo* and the gerunds.

At the same time there is a great deal of truth in what Shakespeare says,

Interest to be roused.

'No profit grows where is no pleasure ta'en.'

It is not right that Latin Grammar should be unmixed drudgery, that all the disagreeable should be found in study, all the pleasure in amusements. If Latin is a good educational instrument because it is hard, that is no reason why the difficulty should be increased by bad method. The difficulty of the subject-matter is educational: Latin will never be play either to the boy in the lowest form or to the boy at the top of the school; but to learn it in a difficult way cannot be educational. Climbing is good exercise for the muscles, but to climb with pebbles in one's boots does not make it better exercise. And though one cannot accept at once the new deductive methods in their entirety, one may get a great deal from them that will make one's teaching more interesting. The new ideas of the doctrinaire reformer often prove most practically useful in the hands of the conservative,—they stimulate thought, enliven the deadness of routine by salutary change. But after all, the inductive method, which works from the grammar to composition and translation, must be the normal method of instruction.

Only let the grammar, composition and translation proceed hand in hand. Let the learner at once see the usefulness of what he has learned by at once turning it to account and

doing something with it which he could not do before. If this is done, it will be necessary after the first declension to supply certain forms of the verb, to learn perhaps the Paradigm of the indicative present of the 1st and 3rd conjugations, and some of the elementary rules of syntax. It will be necessary also to learn a small vocabulary of simple words, which go like *mensa*. This may seem to the theorist an unscientific confusion of different provinces, but in reality it is the only scientific method; for the child not only learns that there is an Accusative case in Latin, but also why it exists, that it is just as wrong to say in Latin *Mater amat filia* as it is wrong in English to say 'Mother loves I.' The learning of vocabularies has been pooh-poohed as cram, because it is merely learning a list of words by rote. But, in the first place, only those words should be learned as vocabulary which have been already met with in the sentences construed, and are to be used again. Next, there is nothing about which a child is so curious when beginning a new language, as knowing what this or that thing 'is called' in Latin or French. Thirdly, the vocabulary furnishes the teacher with matter for exercising the class *viva voce* in the newly-learned forms; there is a certain pleasure in the liveliness of such drill when the teacher knows how to handle a class. Let him insist above all on smartness, making no allowance for the boy who is not thoroughly alert; on articulate speaking, making no allowance for the mumbler; and above all on accuracy,—a teacher should no more think of allowing a boy to slur the pronunciation of the inflexion than a music-master would allow a pupil to play *e* for *f*, or strike between the two notes, not definitely either one or the other. Again, the vocabulary affords the teacher an opportunity of explaining the derivations of English words, such words for example as *terrestrial*, *Mediterranean* on the 1st declension; *domineer*, *dominant*, *puerile*, *reign*, *interregnum* on the

Translation and Composition pari passu with Grammar.

Vocabularies.

2nd; getting at these words as much as possible by a process of questioning, so that the pupils may think out for themselves similar derivations in other words they come across. If the class is learning French, this tracing of derivations may be still further extended. In any case such admixture of etymology is helpful to the memory and conduces to the accuracy of English spelling. The sentences for translation should be as interesting as possible, that is they should be within the range of the boy's comprehension, connected with such things as he sees or thinks about in everyday life. Every now and again the monotony of detached sentences should be broken with a short story, narrating some Greek myth or legend of early Rome. Carefully avoid any petty subject which the boy will despise. He will very soon be able to read the fables of Phaedrus and the simpler myths, or short accounts of Agricola and the Romans in Britain. A visit to the local museum, if it contains any Roman remains, or to any Roman camp there may be in the neighbourhood, will make the whole thing more real to the youthful imagination. Let the class-room be hung with maps and what Germans call Realia, pictures of Roman soldiers, siege-machines and *testudo*, Roman houses and domestic life, Roman triumph processions, going under the yoke, ships, etc. Let these be frequently changed, lest the sameness pall. I should like to see more use made in schools of the Colloquies of Erasmus, and of Latin Hymns and Latin songs like 'Gaudeamus igitur' (with music). Mr Cooke[1] has set an excellent example in translating the stories of Joseph and his Brethren, David and Goliath, from the Latin of the Vulgate into the Latin of the Classics: the same thing should be done with the Gospels and all the more familiar parts of the Bible. It would be a great boon if some competent scholar would undertake the *Arabian Nights* or Stevenson's *Treasure Island*. Lord Dufferin tells us how much the acquisition of Persian was facilitated for him by

[1] Macmillan's Latin Course.

Talbot's translation of the *Arabian Nights* into that language, and aptly asks 'How few of us would have ever acquired French, if we had been confined to Bossuet's Sermons or Montesquieu's History, unaided by the blessed stimulus of Dumas' novels?'

Grammar.

We live in a decade of attenuated Grammars. And it is well. The grammars of our childhood were overloaded with much useless matter which was only learned *in futuram oblivionem*. How many even of those who have kept up their classics have discovered yet any use for the gender of *papilio*, *curculio*, *cicer*, *vomis*, *mugilis*, *vermis*, *cucumis*, or for the declension of Greek nouns in Latin? What advantage has it been to know that no form of the singular of *prex* was found except the ablative *prece*, or that *socer* had a collateral form *socerus*? The very completeness of the old Grammars is their great drawback for a beginner. In a more advanced stage, the study of exceptions may be valuable as illustrating philological principles. But at first let there be as little learning of exceptions as possible. The accidence must be revised from the beginning, at least once a term, until it is well driven in. This gives the teacher a chance of weaving in any exceptional usages which have occurred in the reading, and thus gradually expanding the range of grammatical knowledge. In revision, as in all accidence lessons, one must insist on the class knowing the meaning of the word they are declining or conjugating.

It is not advisable to teach the beginner by stems, making him learn such forms as *domino-*, *milit-*, *ama-*, *mone-*, *reg-*, *audi-* instead of the forms which he will actually meet, *dominus*, *miles*, *amo*, *moneo*, *rego*, *audio*. The 'Crude-form' system, as it is called, may be useful at a later stage when the pupil is more advanced, and interested in the form of the language in and for itself. But to the beginner such forms are embarrassing. He should be familiarised only with the actual forms of Latin words as they are used in the Latin language.

The syntax of the verb should be learned before the syntax of the cases, since it is of more importance both for translation and composition. Many of the simpler constructions,—such as those of final sentences with *ut*, indirect statement and question, the construction with the gerunds and supines—may best be learned by deducing them from Latin sentences. In nearly all text-books the rule is first given in abstract terms, is then learned by heart, and afterwards applied in a long series of sentences. It is a good thing to take first selected Latin sentences, to go through these with the class, giving them sufficient clue to discover the proper meaning, and then making them deduce the rule for themselves by judicious questioning. What they have thus found out and formulated for themselves is far more likely to impress itself upon the memory than if they are told 'This is the rule, here is an example, now apply it to the sentences given.'

Teaching mostly oral at the first.

To come now to the language as such, very much depends on the first beginning, on the way and the spirit in which a child is first introduced to the language. Let the first principle be that as much as possible of the early work be oral. Too often a child is set down with an exercise book to plod his own weary way in silence. To the young mind such a method is repulsive. It stands to reason that what enters by ear-gate as well as by eye-gate will make twice as much impression. It is also a principle of psychology that the attention is keenest where pleasure is felt. That feeling of pleasure is roused by the liveliness of a class which is conducted with the living voice. Let us take an exercise from Latin into English, which contains some six or seven words hitherto unknown. Do not ask them to read the sentence off directly, but pronounce clearly before the class one of these unknown words and let them say it after you from the vocabulary and give you the English meaning. Then let books be closed. Read the whole sentence and

let the class translate it into English without looking into the book, putting in the newly-learned word. Then let the class read the sentence from the book and translate. When this is done, make them point out the predicate, subject, object, attributes, adverb, etc. After a short exercise has been worked through in this way, the teacher may test their remembrance of the new words which they have learned, going over them again and again till they have been driven home. At the next lesson he will hear the old lesson over again; this should be done without opening the books at all. First ask them the vocabulary, English into Latin, Latin into English, then read the sentences in Latin and make them translate into English, and then reverse the process, giving them the English and making them give you back the Latin; this will give occasion for a few elementary hints as to the order of words in the Latin sentence, and the position of emphatic words such as *non*, *nemo*, etc., and of quasi-enclitic words like *enim*, *autem*, *quoque*. Of course, such a process does not exclude a written exercise being required from time to time, and for exactitude there are few things so good[1]. But the teaching of young boys should be mainly by ear and by sentences, and always so at first. Nothing does so much to keep a class together and to give a boy confidence in the handling of strange words and sounds. And it is also important that boys should be accustomed as soon as possible to translate sentences and not disconnected words.

Pronunciation.

With such a system the question of pronunciation becomes one of the first importance. The hybrid and chaotic state which exists in many of our present schools makes good oral teaching impossible. It is not of so much importance which system is adopted, as that

[1] It is well to set verbs for writing out as evening work, and to have printed forms that show by cross divisions which forms are to be formed from the perfect stem, which from the supine, etc.

some definite system be adopted and adhered to in all classes, so that a boy does not get hopelessly bewildered as he goes from master to master up the school. If the school sends on to the University boys who may possibly afterwards take up seriously some branch of philological science, it is best to adopt the scheme formulated by the Cambridge Committee in the year 1887, and approved by the Headmasters' Conference[1]. But in any case, stress should be laid on accurate pronunciation of quantity; no such monstrosities as "*ceshiam*" and "*cego*" and "*mcelior*" should be tolerated. And it will be well to insist on the hard pronunciation of *c*, *g*, and *t* before all vowels, otherwise one will have *citus* mixed up with *situs*, *certum* with *sertum*, *concessum* with *consessum*, and nouns in *-tio* with nouns in *-sio*.

Construing.

To come now to the Construing Lesson. The object is two-fold,—to develope powers of application and versatility of mind; and to give the scholar some idea of Roman life and thought. It is an exercise which requires a constructive effort of the mind. The boy finds himself face to face with words, inflexions, constructions with which he is already familiar. He is required to discover the sense of the passage as a whole. Care should be taken that one does not require the impossible. Too many boys have an idea that, if they look out all the words, that is all that the teacher has a right to expect. And that *is* all the teacher has a right to expect, if the author set is far above the boy's capacity to grasp, and if the boy has not already been taught in class how to set about unravelling the sense. Two things are necessary, careful gradation of the reading, and a few introductory lessons *viva voce* in class showing how a sentence is to be tackled. With an author like Ovid it will be necessary

[1] Compare also *The Restored Pronunciation of Greek and Latin* (Arnold and Conway, Cambridge University Press).

to give, in almost every case, elucidatory hints for the next lesson. For the first two years, the matter for translation will be in the same book as the Grammar and Exercises. This will take the learner through the accidence and acquaint him with the elementary rules of syntax. He will be then ready to start with the lives of Cornelius Nepos. Among these the lives of Miltiades, Themistocles, Aristides, Hannibal are to be preferred. For this and all early reading, editions are to be preferred which give special vocabularies at the end. The manipulation of the larger lexicon entails much useless labour, and the multiplicity of meanings perplexes the beginner.

Next may come Caesar, *de Bello Gallico*, especially Book V, which deals with the invasion of Britain, and gives an account of the island. The personality of Caesar, the strength, energy and generosity of his character, the straightforwardness and simplicity of his style, make a great impression on the mind of the boy who is still in the Red-Indian stage of culture. Then Livy Book XXI will give some idea of the *Sturm und Drang* period of Roman history, when both people and Senate showed what was best in them. Cicero may be introduced with the speech *pro Lege Manilia*, or the Catilinarian Orations. The reading of the poets should come late, not till the 4th or 5th year : if it comes earlier, the labour of extracting the sense will prevent all enjoyment of the poetry for both pupil and teacher. Selections from Ovid's Metamorphoses, e.g. the stories of Proserpina, Daedalus and Icarus, Philemon and Baucis, Orpheus and Eurydice, will be the best to begin with. Vergil's Aeneid may follow on this ; Horace should come late when both scholarship and thought are fairly mature. Much better as an introduction to lyric poetry will be selections from Catullus. This author, if read at all in schools, is as a rule read only by the more advanced boys who are just going up to the University ; but there are lyric poems of his so simple in

their phrasing and their thought that they are well within the grasp of a boy of 14 or 15, and yet at the same time so true in their poetic feeling that I know no Latin reading so likely to stir a boy's interest and even enthusiasm. With the first reading of Latin poetry it will be necessary to give a few simple lessons in Prosody, so that the pupil may be able to scan a hexameter or pentameter verse and the simpler forms of lyric structure.

Preparation in Class.

To set a boy down without any preparatory help to translate an author like Caesar is like expecting him to grope his way through an unknown town in the dark, without giving him any clue as to the main streets. If a boy is set to prepare a passage from Caesar or Nepos by himself, his first idea as a rule is to make a list of the words he does not know, to look them out one by one in the dictionary, taking that meaning which happens to strike him first, to enter all these on his list and then by the help of this list to try to puzzle out the meaning. No conceivable course could be more fatal to success. The first thing to impress on the beginner is that he must tackle a passage sentence by sentence, otherwise it will be hopeless. And in order to make sure of each sentence as it comes, it will be necessary, for the first year of such work at least, for the preparation to be done in class under the teacher's supervision.

One must not expect a beginner to see by instinct the framework of a Latin period and to be able to distinguish the main sentence from the dependent clauses. Do not therefore be angry with a boy who fails, after honest effort, to make out the sense. If he does not find friendly aid from the teacher, he will be only too prone to seek friendly aid from other sources, which will do him harm. Neither, on the other hand, be too ready to help him over his difficulties. That encourages a sort of slip-shod, half-and-half preparation. The best help is that which teaches a young mind to help itself, which trains it

to independence and self-reliance. Never allow yourself or any member of the class to prompt a pupil by telling him the meaning of any word, much less a whole sentence bodily; this is usually repeated in a mechanical way without any real insight into the build of the sentence. Content yourself with directing, and direct chiefly by means of question and answer. A favourite question to ask by way of beginning is 'Which is the subject?' The boy immediately looks for a nominative case. Frequently the nominative case is not there, the subject being understood from the previous sentence, or embedded in the verb; frequently, again, there are only too many nominatives, in apposition, or in dependent sentences. It is much better to ask first 'Which are the dependent sentences?' These the pupil will have been taught to discriminate by their conjunction, or interrogative or relative pronoun at the beginning, and the finite verb at the end. Having eliminated the subordinate sentences, the main sentence is taken first. Ask first for the predicate; then the subject, if expressed, will probably be clear enough. If there is no nominative case, the subject must be in the predicate. In any case the predicate will give a definite clue to the number and person, possibly also the gender of the subject, and therefore gives a better foothold for mastering the rest of the sentence. If there are several predicates in the same mood and person, it shows that the sentences are parallel to each other, whether dependent on a conjunction or not. If the predicate is in the subjunctive mood, the main sentence is either a conditional statement, or a prayer or exhortation, or a dubitative question.

Care must be taken to turn the participial constructions rightly,—shorter constructions, such as *certior factus*, *nuntio adlato*, becoming prepositional clauses in English, 'on receipt of the news' etc.; many again that are passive in Latin becoming active in English, such as '*capta urbe rediit...*' 'having taken the city he returned'; longer ablative absolutes requiring to

be introduced by conjunctions *when*, *while*, *after*, *since*, *although*, *if*. The pupil must be ready to choose rapidly whichever of these constructions is most appropriate to the sense and most effective in English. He must also be shown that the present participle in a Latin absolute construction, or the present infinitive in the accusative and infinitive, or the present indicative after *dum*, where the main verb is historic, will be represented in English by the imperfect.

Above all, before translating, it must be made perfectly clear whether dependent clauses are relative and belong to some substantive, or whether they are adverbial and belong to the main predicate or to some dependent predicate, and, if to a predicate, in what precise relation they stand to the same. 'So and so happened, after what had happened? because what had happened? with what motive? in order that what might happen? so that what happened as a consequence? under what conditions?' and so on.

To take an example from Caesar *D. B. G.* II. 24. 4.

Quibus rebus permoti equites Treviri, quorum inter Gallos virtutis opinio est singularis, qui auxilii causa ab civitate ad Caesarem missi venerant, cum multitudine hostium castra compleri nostra, legiones premi et paene circumventas teneri, calones, equites, funditores, Numidas diversos dissipatosque in omnes partes fugere vidissent, desperatis nostris rebus domum contenderunt.

First eliminate the subordinate sentences (*a*) *quorum... singularis*, relative sentence qualifying *equites*, (*b*) *qui...venerant*, another sentence of the same kind and function, (*c*) *cum... vidissent*, temporal and causal sentence, giving the reason for the main predicate which now stands out clearly '*domum contenderunt.*' The framework of the sentence will be *equites, cum...vidissent, domum contenderunt.* First get at the meaning of this skeleton sentence. '*The horsemen, when they saw...*, *hastened home.*' Then develope the full meaning of the *cum-*

clause. What was it they saw? Put this then first, as an introductory clause, and point out that, if we are to be idiomatic, we must absorb the main subject in it and say 'When the horsemen of the Treviri saw..., they hastened homewards.' Now the adjuncts of the sentence "*Quibus rebus permoti—desperatis nostris rebus*," with the relative clauses, fall into their proper places.

Above all, insist on English. If the above sentence were set to a class, many boys would show up a translation something like the following: 'The horsemen of the Treviri, having seen...*they* hastened home.' This repetition of the subject is very common. It is fatal to pass it by without censure because the boy has made out the Latin. Write up the sentence on the board. Make the class tell you the mistake. If it, or any similar mistake, occurs frequently, make an *index expurgatorius* of such typical errors. Print up the most glaring examples on the wall of the class-room as a terror to evil-doers. Every lesson in Latin may be and should be also a lesson in English. To get at the sense is the first thing, to express that sense in English with equal force and clearness, while preserving the same emphasis, is the second. And no writer of classical Latin can be turned into English without testing and exercising the powers of English expression. Construing, in the narrow sense of the word, is injurious to a boy's knowledge and use of English. The simplest sentence of Livy, Caesar or Cicero, as construed in Giles' *Key*, or on the *Hamiltonian System*, will be proof sufficient, e.g.

Attention to the English.

'With which things being moved the Treviran knights, of whose valour there is among the Gauls a unique reputation, who had come for the sake of help being sent by their state to Caesar...' To rest content with a mere construe of this kind is to do what in one's power lies to kill out of the pupils' minds any latent sense there may be of literary form, any

latent power of English writing[1]. Even in the earliest stages, the class should be called on to put these sentences into clear, readable, idiomatic English,—to translate what they have construed. If this be carried out, the Latin lesson will become a most valuable training in the choice of English words and the ready formation of English sentences.

Later on, the pupil may be encouraged to adapt the style of his translations to the style of some particular author, to follow Milton in translating *Vergil*, Burke in *Cicero*, Gibbon in *Tacitus*, Pope in *Horace*, Ben Jonson in *Plautus*, and so be induced to study more closely and appreciatively the Classics of his own tongue. And the teacher can do much by the way to stimulate boys to read their own literature, particularly when translating a Latin poet. Mr Page has given a good example of what may be done in this direction in his school editions of *Vergil* and *Horace*.

Editions.

Right method in the construing lesson is all-important not only for that lesson in itself, but also for the effect it has on the boy's own method in preparing his work. Sidney Smith has drawn a harrowing picture of the English schoolboy "full of animal spirits, set down on a bright sunny day, with a heap of unknown words before him, to be turned into English before supper by the help of a ponderous dictionary alone." Things have improved since then; the ponderous dictionary has given way to the special vocabulary, and the danger nowadays is rather from ponderous annotations than from ponderous dictionaries. The mistake of our ancestors was in leaving the young unfurnished mind to

[1] The following is taken from a boy's translation of Livy, Siege of Syracuse. "By laying aside the guardianship which was with several things in common, he concentrated to himself alone the strengths of all men. Scarcely was popularity in the eyes of the Syracusans easy to any good and moderate king succeeding so great an affection as of Hiero."

struggle on alone through its own difficulties. The risk in our generation is that the young mind may suffer from too much help, may never learn how to tackle a difficulty because it has always had all difficulties smoothed away, before even they were really felt. The seedling may be killed by too copious watering as easily as by drought. For this evil there are two remedies.

Unseen translation.

a. The weekly Unseen Translation. There are several carefully prepared books of selections which may be used for this purpose[1]. A stock of these should be kept, and one hour a week, if possible, should be reserved, when one of these pieces should be given to be done under examination conditions. Any words the class cannot be expected to know of themselves should be written on the board by the teacher. The written translations should be corrected and given back to the form as soon as possible, the teacher going carefully through the piece, commenting on the mistakes that have been made, and giving in conclusion a model rendering of his own. Here at any rate he will be able to test how far his pupils are able to master the difficulties of the language, and hammer out the sense of an author without the aid of notes. The written translation is a good discipline not only in exactitude but also in power of English expression and style; and, in marking, both these aspects should be considered.

Extemporale.

b. Still more useful in its reflex action on the preparation would be the adoption in English Schools of what is called in Germany the Extemporale. The teacher chooses some passage as far as possible complete in itself, which has not been read by the form and which is in point of difficulty one grade lower than the work on which the

[1] J. H. Fowler, *Sportella*, F. D. Morice, Spratt and Pretor, Wilkins and Strachan, J. S. Reid. The two first mentioned are the easiest.

form is engaged at the time, and may thus be regarded as the standard of the form's work. Sometimes an easier part of the book they are reading at the time fits in very well. For instance, a form reading the third book of Livy might very well use any section of the first 32 chapters for the purpose. Caesar, again, has large sections which run on smoothly and present no special difficulty. If the passage is a strange one, the teacher will need to supply as briefly and clearly as possible the connexion in which it occurs. This done, he asks some member of the class to read aloud a few lines till he comes to a convenient stop. If in this passage there occur any words which are not generally known, the teacher will write them on the board. He then asks those who see the sense, and are prepared to translate, to hold up their hand; and when a sufficient number have notified their readiness, he calls upon one of them to translate, careful neither to allow any other member of the class to interrupt, nor to interrupt himself, except where direction is imperatively called for. So long as the sense is rendered, he will not be too fastidious as to the quality of the English in which it is expressed. It is a good plan to set the passage thus rendered, or part thereof, to be written out in good English for the next lesson, or to revise the passage at the next Latin hour, and insist then upon something more idiomatic. No note-taking should be allowed. Occasionally a boy is put on who does not hold up his hand, for many of the slower, plodding boys will feel at a disadvantage compared with their less industrious, more quick-witted class-mates, who now find themselves probably not for the first time called on to translate unseen, and who have been taught by the force of circumstances to help themselves out more rapidly. It is just for these slower, plodding boys, who are rather inclined to dawdle over their work, that the *extemporale* is most useful. When a boy of this kind is put on, he should receive plenty of encouragement and of

direction, without being actually told anything[1]. Concentration of faculty, readiness in seizing the essentials of a sentence, is what he wants; and he will learn to feel that if he launches boldly on a sentence, after grasping clearly the main obvious features, many points of difficulty will be found to solve themselves as he goes on. Many well-meaning, hard-working boys get the notion that their business is to look out so many words in the dictionary and get up the notes; they get lost in the masses of illustrative matter and erudition supplied by the editor; they are overwhelmed with the detail; they look backwards and forwards and lose all power of self-direction. For such, it is of the highest importance that they should prepare each translation lesson as an *extemporale*. Let them be taught to take it section by section, reading through each section first as though there were no notes, no grammar, no dictionary,—or looking up at most such words as are vital to the main sense,—and then, when they have built up the framework out of their own stock-in-trade, proceed to fill in the details.

It is only by such method of preparation that we can develope that tact which can grasp at the first glance the main drift not only of a single sentence but of a section, and that self-reliance which, as Dr Kennedy used to say, can 'construe through a brick wall.' Nothing will do so much to discourage a boy from the use of illicit cribs as the consciousness that his own powers, properly directed, are quite equal to discovering the sense.

Translations.

Of translations there is a right use and a wrong. Of late there has been a good deal said in their favour. Various authorities have tried to convince us that by their means a boy can be trained to read classics with

[1] A little brochure on the Art of Reading Latin, by Prof. Hale, of Cornell University, U.S.A., may be helpful to the teacher in this connexion. (Ginn and Co., Boston.)

ease and get his mind stored with a copious vocabulary. Experience teaches otherwise. The boy that has once learned to lean on translations will always lean on them. He loses just that sense of effort which forms the main value of any education, whether classical or modern. He becomes a mere reproducing machine. He is perpetually acting a lie. Moreover, the teaching is crippled. The boy who has already had all his difficulties solved, or thinks he has, pays no attention in form; he has never been conscious of the difficulties, he feels no interest in working out with the rest the sense of the original and putting it into good English. But when a book, say of Vergil, has been read in form, and the boy comes to get it up for an examination, it will give new freshness to his work, and raise his whole standard of appreciation and taste, to use a really poetic translation, such as that by the late Lord Bowen or Mr Rhoades. No translation, poetic or otherwise, should ever be used to get the sense of a passage on the first reading.

Composition by Retranslation

To turn to Composition. This, as has been said, should proceed *pari passu* with the learning of grammar and translation. With each advance in knowledge, whether of grammar or vocabulary, the pupil should feel that he acquires fresh power of expression in Latin. A new faculty is called into play. *Kennen wird Können*, as the Germans say. Experience proves that if translation, composition and grammar-learning proceed *pari passu* from the first, they strengthen each other. Grammar, when it is continually practised in converting short sentences, becomes interesting because it becomes useful. Translation is more accurate and more observant when the pupil knows that, after the passage is translated, the teacher will bid him close his book and give him certain words and sentences out of the lesson to put back into Latin; nor should the teacher be content to ask for mere retranslation,—he should ask his class to manipulate the words they have learned in all

kinds of permutations and combinations, calling on them to apply any principle of syntax which he may have had to explain, and bringing in as much as possible of the earlier work in accidence and syntax. Such a method, especially if the teacher knows how to make it interesting by weaving his heterogeneous materials into some connected story or description, is a far more thorough method of driving home the grammar, and testing the preparation of a lesson, than if every word in the lesson were parsed. It tries a boy's knowledge, it makes him apt and ready in the use of it, it throws him on his resources, it stimulates his interest, it teaches him to use his tools, it is to the apprentice in language what manual training is to the craftsman. Moreover it saves time, for one gets as much composition out of a boy in twenty minutes by this method as would take him two hours, if set down to a formal exercise where all the words are strange. This is not meant to exclude, but rather to supplement, such formal exercises as those in Dean Bradley's edition of Arnold. When such exercises are done in class and under supervision, it is a good plan for the teacher to go round the class as the sentences are being done, and mark with a pencil the more obvious mistakes that are being made, leaving the boy to find out what the mistake is and to correct it. In any case, it will not be sufficient simply to return the corrected copies. Your corrections will receive scant attention, unless you demand a fair copy, or—still better—make the class read off the exercise into Latin from the English, and let them take each other up while so doing.

and by Formal Exercise.

For the first three or four years, until the pupil has reached what may be termed Fifth Form Standard, the main thing to be enforced in Composition is accuracy in accidence and syntax. To know an indirect question when he sees it, and to turn it accurately, to turn a speech into Oratio Obliqua, to know what case is used to express instru-

Latin Prose.

ment, duration or point of time, price, goal of motion, &c., that is all one expects. It is chiefly a matter of correct thinking. Afterwards, when these difficulties are mastered, it becomes a matter of taste, of correct choosing. Idiom, rhythm, balance, correctness of phrase, force, directness, simplicity of expression, are the things to be aimed at. And now it is that one should begin to set pieces of continuous English prose. Take care always to set from a good author, to select a passage that has some inherent interest to sting your best pupils into writing Latin worthy of the English. In short, let the piece be worth translating; it is not fair to require minute and prolonged study of a passage which is carelessly written, ill put together and dull. Let it also bear as much as possible upon what is being read in form. It will of course be necessary at first to give some general hints as to how the piece is to be turned, and even to paraphrase whole sentences; but, in doing so, always give the reason.

In looking over, it will be necessary to distinguish sharply between two kinds of mistakes. Offences against accidence and syntax will still occur. These call for severe repression. Offences against idiom, melody or clearness, are different. These are not so evidently wrong, and the boy will fail to see they are mistakes at all, until he is shown how they offend against the canons of usage and taste, and how the sentence may be turned without so offending. This means that each copy must be looked over with each boy individually; his mistakes will be individual and must be individually corrected. This takes time, but literary composition cannot be taught without it. When correcting copies in this way there is a great temptation to the teacher to write his own version over the boy's. But this he should never do, unless he is first satisfied that he cannot use his pupil's own version, and, by re-shaping and amending it, make bad prose into good. Above all be quick to commend any indications you may see of real effort or merit. Be as careful to encourage any germ of real literary

expression, as to stamp out all barbarism. Then, when each copy has been thus given back, the teacher should dictate his own version to the form, commenting on those mistakes which were common to the whole set, or typical in other ways, and carefully explaining the *why* and, if possible, the *how* of his own rendering. This should be as nearly as possible what might have been written by the boys themselves, had they been all they should be. These fair copies the class should be taught to keep in a fair-copy book, with the English written on one side of the page, the Latin on the other, and such general notes on idiom or style at the bottom as the teacher has found occasion to enforce.

There is no royal road for learning Latin Prose. It is learned by doing it. But some things are essential. First, before attempting to put a passage into Latin, the pupil must read the whole piece through carefully and grasp the general sense. Next, he must weigh and analyse each sentence, considering its relation both to what precedes and what follows, determining thereby what words are the most emphatic, and where it will be necessary to group several shorter sentences together round some general idea which dominates them all. Then he will read through some passage in Cicero, Caesar, Livy or Tacitus, which resembles the English passage he has to translate, whether narrative, oratorical, epistolary or philosophical. The teacher may do well from time to time to suggest such a passage, if possible, in a book which has been read by all. Then, and not till then, the pupil will proceed to translate sentence by sentence. He will test carefully, as he proceeds, all phrases whether metaphorical or idiomatic, and never translate them literally unless there is authority for the usage in Latin. He will use the Latin-English Dictionary a good deal, the English-Latin as little as possible. All phrase-books, or purple patches of whatever sort, are to be avoided. Latin Prose must be written, as Wordsworth would say, "with one's eye on the object." On the other hand one must beware of the com-

monplace. It is a common vice of the schoolboy to reduce everything to its lowest terms and then put it into Latin. This, it must be pointed out to him, is mere evasion. The result is mere baldness.

Latin Essay.

Occasionally it will be well to set some original subject, but in that case be careful to sketch out the lines on which you wish the subject to be treated. The form of dialogue is the best. There is no better way of teaching boys to think in Latin, but they are apt to write out what they want to say first in English, and then put poor English into worse Latin; or else they read a lot of Cicero, and tag together bits of sentences into an unintelligible compound. For the few a Latin Essay is a good exercise; for a form it is better as a rule to have a definite piece set them to translate.

Rightly handled, Latin Prose is perhaps the most effective instrument of education a teacher can use. Here at any rate no cramming is possible, no cribs or subterfuges of any kind can do a boy's thinking for him. He is forced to bring himself face to face with each sentence, to strip the thought of its verbal wrappings, to distinguish metaphor from fact, the main idea from its accessories, and then to express the whole in logical sequence and in the most compact, concrete form of which it is capable, with due regard to emphasis, balance and rhythm. Nor is it sufficient to grapple with the sentences one by one. He must master the piece as a whole and the sequence of the thought, marking by appropriate particles the interdependence of the sentences. Such an exercise trains all the powers of the mind, both synthetic and analytic. The very slowness and deliberateness of the process (impossible except in translating into another language unlike our own) instils, as nothing else can, that consciousness of language and plastic power of expression which we call style. Cardinal Newman tells us that he was accustomed every day to translate two or three sentences into Latin, and to this practice he attributed

his command of English style. Lastly, however successful the result may be, it always falls short of the model, it is always improvable; and hence is inbred that humble love of perfection which marks the scholar, as it marks every artist.

Latin Verse.

If Latin Prose is a valuable instrument to train the sense of linguistic form, Latin Verse is valuable to train the sense of linguistic colour and of rhythm. There is no part of the Classical system which has been more bitterly assailed. But no small portion of such criticism falls to the ground as irrelevant, because it criticises Latin Verse-making as though it were an end in itself, instead of being a means to an end. And the end is not the production of poets or even versifiers, but the development of appreciation in the young scholar for that which is poetic in the authors whom he reads. It is perfectly true that at the Public Schools a great deal of time is wasted on Latin verses; it is true that many boys, perhaps the majority, would never be able to write a respectable copy of Latin Verse, even though they spent their whole time at verses. But an education which professes to be literary must make some attempt to train the ear to appreciate euphony and cadence, and the taste to appreciate the picturesqueness, imagery and all the subtler effects and excellences of poetry. The value of Latin Verse should be judged not so much by the actual verses written, as by the reflex influence which it has on the way a boy reads poetry, whether English or Latin. It should make him read with a mind more open to poetic impression, images, beauty and power of every kind,—in short, think the poet's thoughts after him. If this object is not attained, the study is useless. And there is no other method of study which can take its place. Certainly for boys the demonstrative method of lecturing is useless, as is every other method of analytic interpretation. But where these methods fail, imitation may succeed. In order that it may succeed, it is important to begin at the right time. To

set boys of 10 or 11 down to exercises of hybrid Anglo-Latin, and expect them to fit together words, of which they hardly know the meaning, into hexameters and pentameters, before they have read more than a few lines of Ovid or Vergil, is a worse than futile waste of time. To 99 boys out of 100 it is a slow, mechanical drudgery of the most deadening kind. Yet the abuse dies hard, for the simple reason that it entails the maximum of work on the boy and the minimum of work on the master. If we begin at 14 or 15, when boys have read a book of Vergil and about the same amount of Ovid, and if then the teacher will give the first lessons in class, using the Vergil and Ovid as a sample-book, if he will then show on the board how to build up verses by way of example, getting as much as possible by way of suggestion from the class itself, it becomes a most stimulating exercise of the literary faculty. As to how this may be done, I must refer to the lecture by Dr Abbott, late Headmaster of the City of London School, published by the Cambridge University Press.

Repetition.

For Verse-writing it is necessary that a large amount of Ovid and Vergil should be known by heart. The pieces for repetition will be chosen naturally from whatever book the form is reading at the time. Let them be in themselves worth remembering; a great deal of the Ovid learned by heart at schools is not worth the effort of memorising, and boys are as sensible of the fact as anyone. If the lines are worth learning, you will have less compunction and less difficulty in requiring that they be learned thoroughly and well enunciated. There is as much difference in the way boys say repetition, as in the way actors render their parts. It is a real pleasure to hear a boy who says his lines intelligently, who, so to speak, feels the Latin in his mouth. Do not omit to commend him. Do not attempt to cover too much ground, but take the old pieces over again until they are thoroughly well ingrained, and then you will be able to draw on them

confidently for purposes of illustration and composition teaching.

So much for method. But, after all, the main factor in teaching must be the personality of the teacher. If the man himself be dull, any method, however good, must become stagnant and petrifying. Personality of Teacher. *Habe Geist und wisse Geist zu geben.* Let the class feel that they are under the influence of a man, not a machine. When you see that look of apathy and indifference which Oliver Wendell Holmes so well described as the 'ginger-bread rabbit expression,' stealing over the faces of your class, you will know that the method is beginning to pall, and, however theoretically perfect it may be, you will have to change it. Beware of becoming a slave to any text-book,—your business is not merely to hear lessons but to teach, and the great secret of teaching is preparation. 'All men prepare themselves for great occasions,' said Bacon, 'wise men prepare themselves for small.' The schoolmaster who would be worthy of his craft must study beforehand not only what he is to teach but how he is going to teach it. He must prepare, because he will want his mind and his eyes as free as possible for the class. His great object will be to keep in touch with them, to start from what they already know, and to take them with him from point to point, with strides no longer than their own. The hours that can be spared for Latin in the Modern Curriculum are fewer by far than they were in the days of our fathers; all the more reason that we should make the best use of them.

SUGGESTED SCHEME OF LATIN READING.

1st and 2nd years.	Delectus book, Mythology and Historical stories such as Bennett's *Reader*, *Principia*, Pt. ii (Dr Wm. Smith), *Loculi* (Rev. F. D. Morice), *Palaestra*, Macmillan's Latin Course.	
3rd year.	Cornelius Nepos, Phaedrus, Aulus Gellius (*Selections* by Rev. G. H. Nall), Erasmus, *Colloquia.*	
4th year.	Caesar *D. B. G.*, Cicero (*Selections* by Walford or Brackenbury).	
5th year.	,,	Ovid, *Metamorphoses.*
		,, *Fasti* (Hallam).
		,, *Selections* by Wilkinson, Taylor, Heatley and Turner.
6th year.	Cicero, *pro Lege Manilia* or *Catilinarian Orations.*	Vergil, *Aeneid i, ii, v* or *vi.*
	,, *De Senectute, De Amicitia, De Officiis.*	Catullus, simpler poems (*Selections* by Simpson).
	Livy xxi, xxii.	
7th year.	Pliny, *Letters.*	Terence, *Adelphi, Hautontimoroumenos.*
	Tacitus (esp. *Agricola*).	Horace.
	Cicero, harder speeches, *Philippic ii, pro Archia, pro Cluentio, pro Balbo, pro Sulla, in Verrem, pro Murena.*	Juvenal.
		Lucretius (*Selections* by Warburton Lee).
		Plautus, *Trinummus, Captivi.*
	,, *De Oratore, Tusculan Disputations, Letters.*	Propertius, Lucan, Persius.

CHAPTER III.

FRENCH. GERMAN.

THE aim of the teacher of a living foreign language should be to secure to his pupils, with regard to the new language, all the utilitarian and educational advantages which are placed within their reach by the command of their own. Where a due proportion of school time is allotted to his subject, a thoroughly qualified teacher may reasonably hope to set his pupils so far on their way that they are able at the end of their school course,

Aim of the Teacher.

(*a*) to understand readily the spoken foreign idiom,

(*b*) to express thought unhesitatingly and correctly therein,

(*c*) to read with ease and intelligence prose or verse of ordinary difficulty written in the foreign language,

(*d*) to express themselves correctly, in writing, in the foreign idiom.

If the understanding of the foreign speech and ability to use it as a direct instrument of thought are given the first place in this list, it is not therefore intended to minimise the importance of that aspect of language study on which its highest educational value must ever depend. Dwellers in a land where two languages are everywhere spoken side by side do not need to be reminded that language is primarily and essentially speech, and that it is impossible to acquire an

intimate knowledge of a nation and its literature without first acquiring a knowledge of the spoken idiom.

Existing Traditions.

Pessimists will not be wanting to exaggerate the disadvantages under which the newly established Intermediate schools of Wales must labour, for a time at least, in comparison with those schools which represent what is best in the traditions of Secondary Education in England. But, if those responsible for the new schools prove true to their trust, this very freedom from the prescription of tradition will be found to constitute an element of strength rather than of weakness. It is the obvious duty of the authorities to ascertain, in the case of each subject in which instruction is given in the schools, where, under what conditions, and by what means the best educational results have hitherto been obtained. And in the attempt to establish a sound tradition of modern language teaching, it is to Belgium, and to the best schools of Germany and Switzerland, that Wales will naturally look for guidance and encouragement.

Belgium.

The methods of teaching Modern Languages adopted in the schools of Belgium have recently been so admirably described by Professor H. A. Strong in his Report[1] to the Scotch Education Department, that it would be superfluous to refer to them in any detail here. I cannot refrain, however, from quoting at length the section in which he records the normal attainment of the Belgian boy at the termination of the school course.

> "The Belgian boy on leaving school has learnt, if his study has been English, to read something of Milton and Shakespeare, Pitt and Burke; he can understand a speech, a lecture, or a lesson given in English, provided that the speaker utters his words distinctly and deliberately; he can express his own ideas in English, not indeed always very correctly or elegantly, but at least intelligibly, and

[1] Eyre and Spottiswoode, 1893: price sixpence.

so as to convey his thoughts with fair accuracy. He does not possess all our idioms, nor all our peculiar turns of expression, but he possesses the material out of which these are formed. English, as learnt by him, has contributed to enrich his intellect with new ideas, new forms of thought, new figures of speech, and to open a new chapter in the history of language. He has learnt the best way to master the rest for himself. The system of grammar which he has learnt has not encumbered his mind with superfluous technicalities, nor led him to suppose that there are as many systems of grammar as there are languages; but rather that there are certain principles common to all languages, and common in a higher degree to the languages which he is learning. He has not been told that a foreign tongue can be learnt as a child learns it from his cradle; but that reflection and strict attention to orderly methods of progression are the proper substitutes for the power of imitation, which grows less as childhood passes away. The conversational lessons which he has received have taught him to be prompt in the expression of his ideas, and his ear has been trained to catch foreign sounds by methodical practice in dictation; he has learnt something of the ways of thought of other modern nations by perusing works of their best authors. He has left school with the idea, gathered from a long and systematic training, that the study of modern languages is a serious and dignified study, tending to exercise the intellect; and that it offers as a reward the possibility of receiving orally or by means of books the best ideas of the masters of a great literature."

Germany.

At a Conference of the Teachers' Guild, held at Cheltenham in 1890, Mr Stuart MacGowan called the attention of English teachers of Modern Languages to some of the principles adopted by the most successful

teachers of French and English in the schools of Germany. Mr MacGowan has also done good service to the cause of education by introducing many of his English colleagues to the extensive and interesting German literature bearing upon the so-called "Reform Movement" in modern language teaching. It was no difficult task for the reformers to show that the results obtained under the traditional system were eminently unsatisfactory, and to demonstrate, theoretically, the radical unsoundness of traditional teaching methods. Hardly more difficult was it for them to establish the general principles upon which instruction in a living foreign language might be conducted with reasonable hope of securing such results as they claimed the right to demand from the schools. But the most valuable part of the literature of the subject was that which recorded step by step the excellent results actually obtained by teachers who had adopted in practice the principles thus theoretically established[1].

Interesting and convincing as these records are, I have sought to supplement them by careful personal observation. Authorised by the Prussian Minister of Education to observe for myself the methods adopted and the results obtained in some of the larger schools of Berlin, I found an upper form discussing Shakespeare's *Othello* in fluent and correct English. In another school, all the upper forms conversed readily and correctly in French. It must be borne in mind that these were specially selected schools; but it was in a Hanoverian school ranking with an English Higher Grade Board School, and chosen at random, that a still more interesting experience fell to my lot. Here I found a junior form, consisting of some thirty boys, able, within a vocabulary of a few hundred words, to understand instantly, and answer unhesitatingly and fluently,

[1] Cf. Klinghardt, *Ein Jahr Erfahrungen mit der neuen Methode*, Marburg, 1888, and Walter, *Der französische Klassenunterricht. I. Unterstufe. Entwurf eines Lehrplans*, Marburg, 1888.

a succession of random questions put to them in French. The average age of these boys was 11½ years, and they had been learning French for less than six months. It is in view of such results as these that I ask the attention of the teachers of Wales to the principles and method of the new school of modern language teaching in Germany.

The fact that the method is often described as the "Natural" method has given rise to serious misapprehension, which it may be well to remove from the outset. The reformer recognises as fully as any of his critics the many and fundamental differences which exist between the conditions under which the child acquires his native tongue and those under which he proceeds, at a later stage, to the acquirement of a second language. However successful the teacher may be in reproducing the foreign atmosphere in the modern language class-room, the schoolboy breathes this atmosphere during but a small proportion of the time in which his mind is actively occupied, whereas the child, hearing the native speech every day and all day, acquires it with the exercise of but little conscious effort. In the schoolboy, however, intellectual faculties have been developed which were only latent in the child. He is capable of that sustained effort and concentration of thought which are essential to the proper performance of his task. And his progress is, further, facilitated by all such previous systematic instruction in the elements of his own language as may have tended to give him correct notions of the nature and structure of language in general. The "Natural" method is not then a method which claims to reproduce the natural conditions under which the child acquires the power of speaking and understanding his own language. Its claim to the epithet is based on the contention that it is essential to the soundness of a teaching method that it should be carefully adapted to the nature of the subject taught. And, since

The "Natural" Method.

language is essentially and primarily *speech*, it is on the spoken idiom that all systematic instruction in living languages must be based.

The *immediate* aim of the teaching is, then, to enable the learner to understand speech in the foreign idiom and to use it himself as a direct instrument of thought. The greatest stress is accordingly laid on exercises in speaking. The class must hear and use the new language as much as possible from the first, and the native speech must only be employed in so far as it is absolutely indispensable for the clear comprehension of what is taught.

Grammar too is taught according to its essential nature. Itself but a convenient abstract of the facts of language, it must only be studied with reference to language-material which is already familiar to the learner. In the preliminary stages of language-teaching it thus assumes a very subordinate place, and its function remains a subsidiary one throughout the whole course.

Since a foreign language should present itself to the learner's mind rather as the expression of thought in new words than as the mechanical substitution of foreign words for native words, it is no function of the language teacher to train his pupils in the art of synonyms commonly known as translation[1]. He who has acquired the power of expressing thought readily and accurately in two distinct idioms will have no difficulty in reproducing in the one what he has seen or heard expressed in the other.

From the necessary preliminary exercises in pronunciation the teacher should proceed to the treatment not of isolated sentences but of continuous passages. The reading material should form the basis of the whole system of teaching, and, in particular, of the study of grammar, and of all written exercises,

[1] Cf. Findlay, *Preparations for Instruction in English on a direct method*, Marburg, 1893.

which should mainly consist of variously modified reproductions of what has already been read by the class.

The principles thus briefly indicated are those on which it is claimed that the teaching of all living languages should be based. But, in proceeding to deal with their practical application, it will be convenient to describe, in the first instance, a typical course in French, and to supplement this description by a detailed record of a personal experiment in the teaching of German. In the case of both these languages, the limited space at my disposal precludes the treatment of more than a very small portion of a complete school course. But, while the problems which attend the teaching of language are not confined to the initial stages, it is obvious that the greatest difficulties are met with at the outset. And those readers who wish to pursue the subject further will find an abundant literature at their disposal[1].

Outlines of an Elementary Course in French.

The first lessons are of course devoted to the treatment of the sounds of the new language, and, particularly, of those which are not found in the native speech. This treatment must, it is true, be systematic, but no attempt must be made to introduce the elementary language class to the scientific study of phonetics. The teacher should indeed be himself intimately acquainted with phonetic principles, and his knowledge will enable him to assist, by useful practical hints, the reproduction by the class of the more difficult among the new sounds. The pronunciation of the vowels *ö* and *ü*, and of the four nasal vowels, may thus be materially facilitated by the

[1] Walter's experiment (*op. cit.*), and v. Roden, *In wiefern muss der Sprachunterricht umkehren?* Marburg, 1890, have supplied the material for this description of a typical course in French. A useful bibliography will be found in v. Roden, as in Stiehler, *Zur Methodik des neusprachlichen Unterrichts*, Marburg, 1891, and in the valuable and suggestive essay of Widgery, *The Teaching of Languages in Schools*, London, Nutt, 1888.

use of the diagram known as the "vowel pyramid." But it is upon the strong imitative faculty of the child that the teacher must chiefly rely; and this faculty will not, in general, be found unequal to the demand made upon it.

The next step is the committing to memory of very simple poems of content appropriate to the age of the learner, which serve to establish the pronunciation of individual sounds, and, further, to give the learner some practice in sentence-intonation, to which, especially in the case of French, it is necessary to attach great importance. It should be superfluous to add that nothing must thus be committed to memory until its meaning is fully and accurately understood by the class. In this preliminary work, as indeed throughout the elementary course, the books of the class should remain shut as long as possible, the teacher supplying the material orally, so that inconsistent orthography may not aggravate the already sufficiently great difficulty of acquiring a new set of sounds.

It may now be found convenient to describe in French the common objects of the class-room, to predicate simple facts about them, and to frame simple questions, the answers to which will be readily elicited from the class. The early introduction of the numerals provides a plentiful variety of short sentences which will do much to establish correct pronunciation and sentence intonation. The French method of reckoning time may be similarly treated, and it will be found advantageous to utilise at this stage such wall-pictures as those referred to by Strong (*op. cit.*, p. 7) or Hölzel's pictorial representations of the seasons, which are largely used in the schools of Germany.

It soon becomes possible to proceed to the first passage of continuous prose. All books remain closed while the teacher clearly enunciates the first sentence, accurately interpreting its meaning with the coöperation of the class. Though it may at first often prove necessary to concentrate attention upon the

pronunciation of a word isolated from its context, every effort must be made to secure correct sentence-intonation by insisting upon the reproduction of the sentence not as a succession of individual words but as a succession of related word-groups. When the individual word-groups have been successively mastered, the complete sentence is practised in its turn until the class is able to reproduce it with accurate pronunciation and correct intonation.

The sentence thus orally acquired may now be placed before the class in its printed form, or written upon the blackboard. That no doubt may exist as to the learner's accurate comprehension of each individual word, it is recommended that the English meaning be once more supplied by members of the class, in such a way however that no individual is called upon to give the foreign word immediately followed by its English equivalent, a precaution the neglect of which would impose the additional difficulty of adapting the organs of speech in rapid succession to the requirements of two widely differing sound-systems.

To secure the identification of the spoken word with that for which it stands, to establish still further an easy and correct pronunciation, and to ensure as far as possible a complete mastery of the speech-material already acquired, the teacher makes each successive sentence the basis of a series of simple questions in the foreign idiom. Every new word the introduction of which is necessary for the framing of such questions must be orally mastered by the class, and its meaning supplied unless it is sufficiently obvious from the context. If the questions are systematically arranged so that the answers will in turn emphasise the subject, predicate, object and adverbial adjuncts of the original sentence, the learner will have the additional advantage of acquiring almost imperceptibly from the first the main principles of sentence construction. Every answer must of course be in the form of a

complete sentence, and, though the several answers to a series of questions may actually consist of the same words arranged in the same order, the varying emphasis and intonation give to each answer an individuality of its own which the learner will not be slow to recognise. In Walter's record (*op. cit.*) the first passage of continuous prose begins with the sentence: *Un paysan avait remarqué que beaucoup de personnes portent des lunettes en lisant.* In the framing of questions the subordinate clause is first utilised, as follows: (a) *Qui porte des lunettes?* (b) *Que font beaucoup de personnes?* (c) *Que portent beaucoup de personnes?* (d) *Quand portent-elles des lunettes?* The principal clause is then similarly treated in conjunction with the subordinate clause, thus: *Qui avait remarqué que beaucoup de personnes portent des lunettes en lisant?* and so on as before.

At the next lesson the sentence must again be read with correct emphasis and enunciation, and the class tested as to their accurate comprehension of its meaning. And here it may be found necessary to correct new mistakes in pronunciation due to the contemplation of the written or printed symbols. When the class in general has been orally questioned as above, it may be called upon to correct mistakes in spelling made by selected boys who have meanwhile been writing *their* answers on the blackboard. The frequent reappearance of the same word on the board will make the acquisition of correct orthography a comparatively easy task. Questions may also be put orally and answered in writing by all the members of the class.

Each successive sentence is similarly handled, and, when the whole passage has been subjected to thorough revision, the class should be able to read it fluently and correctly, repeat it from memory, explain the precise meaning of every word in it, and answer unhesitatingly any of the questions which have been framed upon it during the course of preceding lessons.

In the earlier stages of language teaching conducted on

such a system, progress must necessarily seem slow. But the learner's consciousness that he is acquiring, in some degree at least, the control of a new instrument of thought, will constitute from the first a strong element of interest. And it should not be difficult, on the other hand, for a teacher whose heart is in his work to obviate, by freshness and variety of treatment, every danger of monotony. And with increase of acquired material comes increased variety of treatment. A story in which two or more characters are introduced may be related successively from the standpoint of each of them. Indirect narration may be substituted for direct; a narrative passage may lend itself to reproduction in dialogue form; or, again, the substance of a historical passage may be reproduced in a condensed form in the learner's own words. Interesting specimens of this form of exercise, worked by a class of German boys after a year's instruction in English, may be seen in Klinghardt's appendix (*op. cit.*). The alternation of written with oral work in the case of all these exercises will do much to secure accurate orthography, which may be further established by periodical exercises in dictation.

Introduction to the Study of Grammar.

Grammar is gradually and inductively acquired from the language-material already assimilated. The most elementary and common phenomena are taken first, and, in particular, the verb-tenses of most frequent occurrence, the inflexion of the article, the personal pronoun, the commoner forms of the relative, the numerals, and the normal inflexion of adjectives and substantives. Everything abnormal is reserved, and such "exceptions" as the schoolboy never meets outside his grammar are deliberately and consistently ignored. Care must be taken to gather a sufficient number of particular facts before proceeding to establish the general principles which underlie them. Thus the material acquired will soon be found to include a considerable number of substantives accompanied by their appropriate

articles. A tabular arrangement of these reveals to the class the inflexions which the article undergoes for gender and number. And it will gradually be found possible to establish all the more important facts of elementary grammar in a similar way[1].

Use of the Foreign Idiom.

Meanwhile every effort must be made to restrict as much as possible the use of the native idiom, with the view of conducting the whole work of the class at the earliest possible moment entirely in the foreign speech. When the ear has been trained from the first to distinguish the sounds of the new idiom, and the organs of speech to reproduce them, and when each successive passage has been made in its turn the basis of systematic speech-exercises, it will prove feasible, at a comparatively early stage, to give a large proportion of the necessary explanations in the foreign language itself. And when a fairly large vocabulary has been acquired, a carefully graduated Reader will rarely present a strange word whose meaning cannot be clearly explained by the aid of words already known.

Choice of Reading Material.

When the work of the class can thus be conducted with comparative ease without the use of English, the satisfaction of the first two requirements laid down at the beginning of this chapter becomes merely a matter of time. It must not however be forgotten that the highest educational value of the language course will depend on the wise choice of reading-material. The preparatory reading-book must have regard to the age and capacity of the learner, but it must also have regard to the higher purposes of language instruction. For young children the most suitable French Reader is that of Dr Karl Kühn[2], an English edition of

[1] Mr H. Courthorpe Bowen thus treats grammar inductively in his *First Lessons in French* (Macmillan), which have, for the rest, very little in common with the method here described.

[2] *Französisches Lesebuch, Unterstufe*, Leipzig, Velhagen und Klasing,

which is greatly to be desired. The author claims in his preface that the contents of the Reader should be adapted to the age of the learner, that the language should be simple, as the language of children naturally is, but, above all, that the subject-matter should be essentially French and supply an unpretentious outline of modern French life[1]. Subsequent reading-material must be chosen with the view of bringing the learner into touch with contemporary foreign life and thought. A generous interpretation of this condition will not preclude the introduction of material bearing upon manners, customs, history, geographical configuration and political organisation of the country whose language is the medium of instruction. Such a course of reading will not only be valuable in itself, but will facilitate in a high degree the appreciative study of the great masterpieces of the foreign literature at a later stage.

Written Exercises.

When the class is fairly sure of its French orthography, exercises in dictation may be less frequently given, and further experiments may be made in the direction of free composition. The teacher may call for the reproduction, in writing, of the substance of a French passage read aloud by him to the class, or may require a written description of a historical event the main facts of which are familiar to all. Other devices will suggest themselves to every teacher, whereby facility of expression in written French may be surely, if gradually, attained.

Place assigned to Grammar.

It remains to make clear the place of Grammar in the method of language teaching here set forth. It is contended that the teaching of grammar should be based upon the language-material

5th ed., 1895. Most valuable supplements are the same author's *Uebungen zum französischen Lesebuch*, and *Der französische Anfangsunterricht* (ibid., 1887). Dr Kühn has also published a *Französisches Lesebuch für Anfänger* (2nd ed., ibid., 1895).

[1] Cf. Findlay, *op. cit.*, p. 5.

already acquired, and that the learner should regard grammar, from the first, as but a convenient abstract of the facts of language. The reformer claims to find the real value of the study of grammar in the logical training which attends the process of arguing from the particular to the general, and subsequently from the general to the particular. He does not therefore necessarily assume that the whole body of grammar should be constructed inductively by each individual learner. When the boy has discovered for himself that grammatical "rules" are not the arbitrary tyrants of language, but represent a handy summary of observed language phenomena, he will be in a position to make intelligent use of a small and concise grammar, which thus, in the form of a *reference-book*, becomes his companion from a comparatively early stage. Nor is the systematic study of grammar precluded by the principles here advocated. For the purpose of checking and revising what is already acquired, a grammar is indeed indispensable. But the teacher should not insist on the acquirement of any group of grammatical facts which have not, for the most part, been copiously illustrated by the language-material already acquired. Teachers will find it convenient to frame for their own guidance an elementary course of grammar corresponding to the curriculum of each of the first two years. Within this period it will be found possible to establish, with the coöperation of the class, all the most essential grammatical facts. This process will be greatly facilitated if the class has previously acquired an intelligent grasp of the principles which underlie the grammar of the native language[1]. In view of the system of teaching here advocated, the most convenient Grammar would be one written in the foreign language with special reference to the needs of English learners, in which a clear

[1] The recognition of the fact that the fundamental principles of grammar are common to all languages constitutes a conspicuous merit of Sonnenschein's *Parallel Grammar Series*.

statement of the essentials should not be obscured by the superfluous matter with which many existing grammars are so plentifully supplied.

Some Objections considered.

It may be well to notice here some of the chief objections which have been raised to the system of language-teaching thus briefly and imperfectly outlined. Some of its opponents tell us of a subtle and valuable form of mental training which must be sacrificed if the formal study of French and German grammar is subordinated to other aims. It would not be easy of demonstration that there exists any important kind of mental training which cannot be gained apart from the study of formal grammar[1]. But it may console these critics to be reminded that its hypothetical existence will not be seriously imperilled as long as the accepted methods of teaching Latin and Greek are such as they have hitherto been. The reformers are also accused of wishing to annihilate at one blow the valuable work of long centuries of grammarians, and to substitute therefor an inductive process which it is utterly beyond the strength of the immature youthful mind to undertake. The first of these objections has been incidentally answered in an earlier part of this chapter. The second depends for its validity upon an obsolete conception of the function of the teacher. It may surely be assumed that our school teachers are teachers in fact and not only in name, and that the scope of their activity is not limited to the mere testing of acquirement and visitation of failure.

Others again naïvely object that a foreign language can only be perfectly acquired in the foreign atmosphere. That

[1] "Die Fabel von der formalen Bildung muss aufgegeben werden. Eine solche giebt es im allgemeinen gar nicht, sondern es bestehen so viele Arten derselben, als wesentlich verschiedene Gebiete geistiger Beschäftigung bestehen." Rein, *Pädagogik im Grundriss*, Stuttgart, 1893. Cf. also Widgery, *op. cit.*, p. 32.

French or German can best be acquired in France or Germany, even the most ardent reformer will not deny; but it must not be forgotten that many, to whom a practical acquaintance with foreign idiom may at any moment become of the utmost importance, cannot hope to spend any substantial period of time abroad, but must pass direct from school to a life of unremitting activity in the sphere in which they mean to secure a position and a livelihood.

A favourite attitude of those who would not judge, but prejudge, the whole question is expressed in a scornful protest against what they term "courier French" or "nursery German." The reformer has no desire to substitute facility of speech for any of the aims which school-teaching in Modern Languages has hitherto held prominently in view. His appeal is not for substitution but for superaddition. He maintains that the acquirement of a living language as a direct instrument of thought will secure that everything which is now learnt will be learnt the more thoroughly, and that boys on leaving school will have the additional advantage of being able to converse easily and correctly in the foreign idiom. And in support of this he adduces the results of experience which show that boys who have passed through the English curriculum of the best Belgian or German schools have been brought more into touch with English life and thought, and have a more thorough acquaintance with our literature than is the case, *mutatis mutandis*, with our own students who have completed the traditional school course of French or German. He claims that the studies of the philologist, and of him who wishes to acquire a language solely for the sake of its literature, must remain incomplete as long as due importance is not attached to an intimate acquaintance with the phenomena of living speech. And indeed, it would seem indisputable that the literature of a living language cannot be fully appreciated while the reader's acquaintance therewith is restricted to the

mere symbols which serve as the more or less arbitrary representation of sounds.

Other opponents have criticised the subordinate place assigned by the reformer to the process of translation. We might here expect opposition to be based upon the not unreasonable allegation that translation is a most valuable aid to the acquirement of a thorough and accurate acquaintance with the foreign language. But the loudest objections come from another and unexpected quarter. We are seriously assured that the chief aim of the teacher of French or German should be to improve the learner's knowledge of his native English, and that, if translation is to take a subordinate place in the Modern Language curriculum, the interests of English will be seriously imperilled. It is indeed time that our schools should recognise the paramount importance of imparting to English-speaking boys a sound knowledge of English, and of inspiring them with a love for English literature. But the modern language class-room has another, if less important, function. And it is a matter of surprise to me that teachers of English, and of those subjects which are, and must be, entirely taught through the medium of English, do not indignantly protest against the implied assumption of their inability to instil into their classes the habit of correct and idiomatic English style. I would not have it thought that I do not recognise the excellent kind of mental training which careful and accurate translation supplies. But it seems to me that, if English is properly taught in our schools, it should be possible even for the student who knows no language but his own to attain full command of a correct and cultivated style. The form of mental training whose possible loss is deplored will still be assured by the school curriculum in Latin or Greek, in which translation must continue to occupy a prominent place. Translation in the Modern Language class-room is only indispensable in so far as it is impossible to ascertain without it

whether the student fully grasps the meaning of the foreign text. If a teacher finds it possible to conduct successfully a course of French or German without the medium of English, he may well afford to regard with equanimity the sacrifice of the mental training involved in the process of translation, which, valuable though it is in itself, will sink into insignificance by the side of the immense compensating advantages which he will have secured in other directions.

Phonetic Transcription.

To facilitate the rapid acquirement of a correct pronunciation by the avoidance of the confusion caused by the inconsistencies of French orthography, many German teachers make use of phonetic transcription until constant practice has given the class a firm grasp of the new sound-system. And it has been argued by Mr Widgery that the confused idea which English orthography affords of the connexion between sounds and their symbols renders such a device particularly desirable during the early stages of French instruction in English schools. It is perhaps premature to pass final judgment on a point with regard to which there still exists much difference of opinion among the reformers themselves. But it seems unfortunate that the opponents *à outrance* of this item of the reform programme ignore both the specific advantage which the pupil gains when revising by himself the work which has been done orally in the class-room, and the mass of apparently unimpeachable testimony to the practical success of the method wherever it has been given a fair trial. When phonographs are to be had at a price which will place them within the reach of the average school-boy, he will be able to reproduce *ad libitum* the sounds which have been uttered for his imitation in the Modern Language class-room. Until then, the method of phonetic transcription will continue to have advantages which cannot be altogether nullified by the inconsistency and complexity of many of the phonetic schemes upon which past

experiments have been based. The universal adoption of identical symbols to represent identical sounds would do much to disarm even the legitimate opposition which the advocates of the new departure have hitherto had to encounter.

The most serious difficulties in the way of the adoption of what is best in the reform programme are not those which are usually propounded in discussion. First and foremost I would place the fact that a very considerable proportion of those to whose lot it falls to teach French and German do not know the foreign language as a living tongue (*lingua*), and cannot therefore teach it as such. Those again who are fortunate enough to possess a sufficient command of the living language do not always realise that successful teaching of language, as of all else that is taught, must be the outcome of a well thought out plan, in which the means are carefully adapted to the end. And thirdly, the preparation which such systematic teaching requires from the teacher would exact the sacrifice of a large proportion of his too scanty leisure. Personally I cannot hope that even those more general teaching reforms which we all acknowledge to be desirable will be carried out in English schools until a substantial reduction is made in the number of hours of class-teaching demanded of the individual teacher. I have never heard it suggested that the teachers of the French Lycées are underworked. And yet the staff of the average English secondary school would have to be doubled at least, before the English teacher could command for the preparation of his lessons the same amount of time as is normally at the disposal of his French colleague.

Real Difficulties.

Other difficulties which hamper the teaching of modern languages in many of the English schools will not, it is hoped, be found to exist in the new secondary schools of Wales. It must be fully recognised that, during the first two years of instruction in a foreign modern language, a daily lesson—not

necessarily extending over a full hour—is essential to the attainment of the best educational results. The size of the class, too, is an important consideration where so much depends on the amount of attention which the teacher is able to give to the individual learner. An energetic and fully qualified teacher will find no difficulty in dealing adequately with a class of from fifteen to twenty boys. But while any further increase assuredly tends to bring about a proportionate retardation of progress, it is encouraging to observe that the junior classes of those German schools which are most distinguished for proficiency in French and English are not smaller than the corresponding classes in the schools of this country.

It would be a boon to the modern language teacher, and indeed to all his colleagues, if the school authorities would refuse to admit scholars at any other time than the commencement of the school year. Such interim admissions are unfair to the teacher, prejudicial to the work of the class, and not without grave disadvantage to the scholar thus irregularly admitted. It is interesting to note, in this connexion, that "the success attending the teaching of modern languages in Belgium depends on the rule which forbids the admission of new pupils at other times than at the beginning of the *année scolaire*" (Strong, *op. cit.*).

As far as England is concerned, it is obvious that some of the most serious difficulties can only very gradually be surmounted. If headmasters should forthwith unanimously and rigidly insist on thorough mastery of the spoken language as an indispensable qualification for teachers of French and German, the relatively small supply would necessitate the omission of modern languages from the curriculum of a large proportion of existing schools. And, for similar reasons, it would at present be quite impracticable for headmasters generally to refuse to place untrained teachers upon their teaching-staffs. Nor would it be fair to expect headmasters to

diminish substantially the number of hours of class teaching required from their assistants, until experience has shown that assistants are forthcoming whose general training and special qualifications guarantee that such reduction of teaching hours shall involve no diminution in the sum total of what is efficiently taught.

The Outlook in Wales.

But the educational conditions of the Principality render the outlook more hopeful. No dull resistance of leaden tradition hampers the schools of Wales in their attempts to proceed by the best educational means to the highest educational ends. And, as the success which attends the teaching of modern languages in Belgian schools is doubtless in some degree due to the fact that not a few Belgians are bi-lingual from their childhood, so in Wales the task of acquiring a new language will be materially facilitated by that practical acquaintance with two idioms which a large proportion of the scholars already possess.

In Wales too the schools are not, and need never be, haunted by the grim Examination phantom which terrorises to such an extent the educational conscience of England. The function of the Central Welsh Board will not be to stereotype secondary education by establishing a rigid system of examination which shall determine the nature and scope of the curricula of the schools; but rather, having regard to the conditions of individual schools, to test their efficiency by the spirit in which the curriculum has been conceived, and by the degree in which it has been successfully carried out. The Welsh University has given its recognition to the principles on which alone school instruction in French and German can be logically based, by including in its entrance examination a test of oral proficiency in each of these languages.

It would be futile to insist on the adoption by the schools of the principles hereinbefore set forth without providing a

Training of the Teacher.

supply of teachers whose training and qualifications may enable them to satisfy the demands made upon them. With a department of Education in each of the three national Colleges, it will surely not be possible to say of Welsh schools—as was recently asserted of English schools—that the teacher of French "generally starts with a hazy notion of how he was taught at school as his whole stock in trade." The Senates of the respective Colleges have already recognised the need of providing for the schools modern language teachers who, by residence in France or Germany, have acquired that mastery of the spoken language which is essential to efficient teaching; and one College has already taken active measures to suppiy this demand. It is to be hoped that the County Authorities will also take steps to provide qualified teachers for the schools whose interests are committed to their care. County Councils should be empowered to apply, in the interests of secondary education generally, the funds at present reserved for the purposes of technical instruction. It would then be feasible for them to supply accepted candidates for masterships with the means of mastering the spoken language by passing a substantial period of time in the foreign country. In the case of teachers who, though lacking this qualification, have already done valuable service as members of the staff of a County School, it would be desirable and politic to grant them leave of absence for the same purpose, and to assist them by making good the whole or part of the salary which they would have earned during the period of their residence abroad. It would obviously be necessary to safeguard the interests of the county by imposing conditions which should secure, for a minimum term of years, the subsequent services of the teachers thus assisted; or, alternatively, the repayment of the whole or part of the outlay. The framing of such conditions should, however, present no difficulty.

German.

While the principles here more particularly applied to the teaching of French are equally applicable to the teaching of any living foreign language, it should be noted that instruction in German may be greatly facilitated from the first by the judicious[1] introduction of words which bear the same meaning as English words of identical or similar sound. Translation may thus be dispensed with at an earlier stage than in the case of French. Indeed the remarkable success of the elementary German classes conducted by Rektor Scholz[2], in connexion with the Jena Modern Language Holiday Course for Teachers, has shown that a skilled teacher need scarcely have recourse to the medium of English at all.

An Experiment in the Teaching of German.

In the conviction that all teachers will attach greater importance to the record of a practical experiment, however imperfectly conducted, than to the fullest exposition and discussion of abstract principles, I have ventured to conclude this chapter with a partial account of an experiment recently undertaken by myself with a view to ascertain how far it is actually feasible to restrict the use of English during the early stages of class instruction in German. While having primarily in view the conditions of school teaching, I was obliged, in the absence of facilities for experimenting upon a class of boys or girls, to form a class of students of maturer age desirous of taking up the study of German from the beginning. It was therefore necessary to introduce a certain proportion of material[3]

[1] "Words are not to be taught simply because they are similar, but because they are this, and are *also wanted* by us for our present purpose." Findlay (*op. cit.*).

[2] It is a matter of great regret to me that the excessive modesty of Dr. Scholz led him to decline my request that he would contribute to this work a chapter on the Teaching of German.

[3] E.g. the letter from an English student at a German University. In a class of boys a letter from an English boy in a German school might have been substituted.

little suited to the age and interests of the lower forms of a secondary school. And the conditions of the experiment—not, in my opinion, rendered more favourable by the comparatively advanced age of the learners—were specially advantageous in so far that the class was a small one, consisting of but seven members. Modification of subject-matter involves, however, no modification of the method in which it is treated. And, while much depends on the size of the modern language class, experience would seem to indicate that the German classes in Welsh secondary schools are not likely, within the near future, to assume unwieldy proportions. It is therefore hoped that the subjoined record will prove usefully suggestive to school teachers, notwithstanding the different conditions under which their own work is conducted. The practice, so frequent among the teachers of Germany, of comparing notes as to their class-room experiences, has done much to advance the cause of education in that country; and its adoption among ourselves could not fail to be productive of great good. Every honest experiment in the art of teaching has its lesson of encouragement or of warning—perhaps of both—the communication of which must tend to lessen, in some degree at least, the deplorable waste of educational force which is a necessary outcome of the systematic isolation of the individual teacher.

The class whose work is here partially recorded met five times weekly during a term of ten weeks' duration, at the end of which it was incorporated with an ordinary College class. The limits of space at my disposal make it impossible to give a detailed account of more than a portion of the term's work; and I have elected to report the progress of the class up to the point where it proved able to understand and appreciate a simple piece of genuine literature with the sole aid of such explanations as might be supplied in German. The difficulties of the undertaking did not of course end here, but their number

and importance decreased rapidly at every subsequent stage. It was my original intention to banish English entirely from the lecture-room during the hours allotted to the class. But the necessary absence of some members of the class from the first lesson of each week suggested the discussion, in English, with those who were present, of the grammatical facts deducible from the language material treated during the previous week. The absentees were thus able to obtain reliable notes of the work from those who had been present. The arrangement thus suggested by fortuitous circumstances proved to have its advantages; and I am not sure that I should not adopt it from deliberate choice, if it fell to my lot to conduct a school class in the elements of a foreign language. The most real danger connected with the "direct" system of modern language instruction is undoubtedly to be found in the tendency to neglect, in a greater or less degree, the systematic study of the grammatical phenomena supplied by the language material already acquired. And this danger is effectively obviated by a weekly revision in which the most detailed explanations can be supplied without any possibility of obscurity or misunderstanding. With this exception I can hardly recall a single occasion on which I found it necessary to have recourse to the medium of English. The results of the term's work were gratifying in every way; and the keen interest taken by the members of the class in their own progress was, in itself, sufficient reward for the not inconsiderable expenditure of time which the experiment demanded from myself.

The record here supplied is, for the most part, an accurate transcription of the work actually done from day to day during the first twenty-eight meetings of the class. And, in the interests of accuracy, I have forborne to incorporate many modifications which the revision of such an experiment inevitably suggests. The only alterations which have been made consist in the correction of a few German expressions which I have since

L. of C.

found to be unidiomatic, and the reproduction of which in print could serve no good purpose[1]. Considerations of space have necessitated the presentation of the record in a very concise form, but it is hoped that every step will be sufficiently elucidated by the indications contained in the earlier portion of this chapter. It only remains for me to acknowledge my great indebtedness to Dr Scholz, of the Jena Holiday Course, but for whom this experiment would never have been undertaken, and to Dr J. J. Findlay, from whose *Preparations for Instruction in English* I have borrowed so largely that the fullest acknowledgment must remain but a poor restitution.

AN EXPERIMENT IN THE TEACHING OF GERMAN FROM THE BEGINNING ON A DIRECT SYSTEM.

(No. 1.) *Apparatus:* a map of Europe: photographs of a German officer, and of an Englishman and a Welshman known to the class.

Was ist das? Das ist England (Deutschland, Wales). Ist das England? ja, das ist England (&c.): nein, das ist Deutschland (&c.). England (&c.) ist ein Land. Ist England (&c.) ein Land? ja, England (&c.) ist ein Land. Dieses Land ist England (&c.). Ist dieses Land England (&c.)? ja, dieses Land ist England (&c.): nein, dieses Land ist Deutschland (&c.).

Was ist das? Das ist ein Mann, ein deutscher Mann, ein Deutscher. Und das ist ein englischer Mann, ein Engländer:—ein wallisischer Mann, ein Walliser.

Ist dieser Mann ein Engländer (ein Deutscher, ein Walliser)? Nein, er ist ein Deutscher (&c.). Ich bin ein Engländer. Sie sind (er ist) ein Walliser. Was bin ich? was sind Sie? was ist er?

[1] The necessity of the corrections here referred to was pointed out by Dr Karl Breul of Cambridge, who kindly read the record both in manuscript and in proof, and made many welcome and valuable suggestions, some of which are indicated in their place.

was ist dieser Mann? Sie sind ein Engländer; ich bin ein Walliser (&c.). Sind Sie ein Engländer? Bin ich ein Deutscher? Nein, ich bin ein Walliser; Sie sind ein Engländer (&c.).

The above, and similar short sentences (formed of the same materials) were practised until the members of the class understood each when spoken, and readily gave correctly pronounced answers to questions put. A complete sentence was required by way of answer. The whole instruction was oral, but, at the end, a small portion of grammar was abstracted, and written on the blackboard, thus:

Pronomen (Fürwort)	*Verbum* (Zeitwort)
ich	ich bin
Sie	Sie sind
er	er ist

Vocabulary. England, Deutschland, Land, Mann, Engländer, Deutscher, Walliser.—ein (Land, Mann, Engländer &c.), dies*er* (Mann), dies*es* (Land), (ein) deutsch*er*, englisch*er*, wallisisch*er* (Mann).—was? das, ich, Sie, er.—bin, ist, sind.—ja, nein.—und.

N.B. Frequent use was made from the first of such expressions as: "Haben Sie verstanden?" "Noch mál!" ("Nóch einmal!") "Sagen Sie..." &c.

(**No. 2.**) *Apparatus* as before. The first lesson was carefully revised, the sentences being further varied by the addition of the word *nicht.*

Ich heisse Spencer: Sie heissen Evans: er heisst F. (&c.) [this was practised in all possible combinations with the foregoing: e.g. heisst dieser Mann Evans? Nein, dieser Mann heisst nicht Evans, er heisst Phillips (&c.)].

Ein englischer Mann heisst ein Engländer: ein deutscher Mann heisst ein Deutscher: ein wallisischer Mann heisst ein Walliser. (These with all possible negative and interrogative combinations.)

Sentences containing all words used during the first two lessons were then written on the board, and the words were arranged according to their place among "parts of speech."

Vocabulary: heiss*e*, heiss*en*, heiss*t*—nicht.

(**No. 3.**) *Apparatus* as before. *Work:* the repetition of what had been previously acquired, and of the subjoined material in all possible combinations.

Ich bin in Wales: wir sind in Wales: wir sind alle in W.

Ich bin der Professor: Sie sind ein Student: Sie sind alle Studenten: wir sind nicht alle Professoren (interrogation &c.).

Sie sind alle Walliser: Sie lernen alle Deutsch: lerne ich Deutsch? er lernt Deutsch &c. (combinations as before).

Vocabulary. Student, Studenten: Profĕssŏr, Professŏren.—der (Art.), alle—wir—lern*e*, lern*en*, lern*t*—in.

The following was also written on the board:

Verbum

sg.	pl.
ich heiss-*e*	wir heiss-*en*
lern-*e*	lern-*en*
Sie heiss-*en*	
lern-*en*	
er (heiss-*et*) heiss-*t*	
(lern-*et*) lern-*t*	

The following was then taken as READING LESSON I.

England ist ein Land und Deutschland ist ein Land.

Was ist dieses Land? dieses Land ist Wales.

Wir sind in Wales, und wir lernen Deutsch.

Der Professor ist kein Deutscher (i.e. nicht ein Deutscher); er ist ein Engländer.

Wir Studenten sind keine Engländer; wir sind Walliser.

Dieser Mann heisst Phillips: er ist kein Engländer, er ist ein Walliser.

Questions were dictated in German, and the students wrote opposite each question a suitable German reply.

(**No. 4.**) *Apparatus:* the hands and fingers of the teacher.

Das ist eine Hand: das sind zwei Hände.

Ich habe zwei Hände: Sie haben, er hat zwei Hände (these in combination with words already learnt, and in question and answer).

Wir haben alle zwei Hände.

Wie viele Hände habe ich? haben Sie? hat ein wallisischer Student? (&c.) Wie viele Studenten sind hier?

Das ist ein Finger (pronunciation!): ich habe einen Finger: das sind zwei Finger (&c.).

Wie viele Finger sind das? das sind drei, vier, fünf, sechs, sieben, acht, neun, zehn Finger. Eine Hand hat fünf Finger: zwei Hände haben zehn Finger. Wie viele Finger hat eine Hand (&c.)?

Wie viel ist zweimal zwei? Zweimal zwei ist vier. (So 2×3, 4, 5; 3×2, 3; 4×2; 5×2.) Wie viele Hände haben zwei Engländer? drei Walliser? vier Professoren? fünf Studenten? (&c.) Wie viele Studenten sind Sie?

After much practice and repetition of the above in all possible combinations, the new vocabulary was written on the board: the students were requested to write for next time a series of German sentences containing the words already learnt.

Vocabulary. Hand, Hände, Finger (s. and pl.),—ein (Finger, nom.), ein*en* (Finger, acc.), ein*e* (Hand), kein (Deutscher &c.), (wie) viele, zwei, drei, vier, fünf, sechs, sieben, acht, neun, zehn.—habe, haben, hat, haben—hier, wie viel?

(No. 5.) (Conducted in English for reasons explained.)

The class was guided to the conscious observation of various points of pronunciation already assimilated by imitation. The following grammatical facts were also noted.

Substantive. Gender: masc., fem., neut. *Grammatical Gender.*

Number, Declension: some nouns (hitherto in *-er*) the same in plural, e.g. Finger, Engländer, Walliser.

Some add *-en*, e.g. Student-*en*, Professor-*en*.

Some add *-e*, e.g. Händ*e*: some change root vowel (cf. Eng.), e.g. H*ä*nde.

Def. Article. Masc. sg. nom. der Professor.

Demonstrative. Dies*er* Mann, dies*es* Land.

Indef. Article. Ein Mann, Finger: ein*e* Hand: ein Land.
Ein*en* Finger.

Adjective. Ein wallisisch*er* Student, ein englisch*er* Professor, &c.

Verb. (*a*) Auxiliary: ich habe &c., ich bin &c.

(The use of the capital in *S*ie was explained: and attention called to the identity of the plural forms of verb tenses, e.g. wir, Sie, sie haben.)

(*b*) Present tense of lernen, heissen.

General. We have found both *-e* and *-en* as plural endings (see above).

-er as a masc. sg. nom. ending, e.g. d*er*, dies*er*, ein deutsch*er* Mann.

-e also as a feminine singular ending: ein-*e* Hand.

-es as a neuter singular ending, dies*es*, all*es* &c.

(**No. 6.**) *Apparatus:* that of Lesson 4, and sketch of human face.

Was ist das? das ist ein Auge. Der Mann hat zwei Augen. Ein Cyklop hat nicht zwei Augen, er hat ein Auge. Wie viele Augen habe ich? haben Sie? hat ein englischer Student? haben drei Professoren? &c. &c.

Das ist das Auge: das ist die Hand: das sind die Finger.

Das ist der Mund (ein Mund): dieser Mann hat ein*en* Mund: ich habe (&c.) einen Mund.

Ich spreche mit dem Munde (Sie sprechen, wir sprechen... with questions and variations). Womit spreche ich? (&c.)

Was mache ich (machen Sie, &c.) mit dem Munde?

Was machen wir mit dem Auge? mit den Augen?

Wir sehen, Sie sehen, ich sehe mit dem Auge, den Augen.

Womit sehen Sie? (&c.)

Was mache ich mit der Hand? ich schreibe (wir schreiben, er schreibt) mit der Hand.

The above were practised in all possible combinations together with the foregoing words and groups of words.

Vocabulary. Auge, Augen; Mund (dat. Munde)—das (neut. sg.), die (f. sg.), die (pl.), dem (dat. masc. and neut.), der (dat. fem. sg.), den (dat. pl.)—sprech-*e*, sprech-*en*; seh-*e*, seh-*en*; mach*e*, mach*t*, mach*en*; schreib*e*, schreib*t*, schreib*en*—womit?

(**No. 7.**) *Apparatus:* photograph of the German Imperial Family.

The work of Lesson 6 was carefully revised with as much repetition and variation as possible.

Victoria ist die Königin von England: Wilhelm ist der König von Preussen: er ist auch der Kaiser von Deutschland. Hier ist ein Bild von Kaiser Wilhelm: das Bild ist gut: es ist ein gutes Bild. Dieses Bild ist ein Bild des Kaisers (von dem Kaiser[1]) von Deutschland (des Königs von Preussen). Das ist die Königin von Preussen, die Kaiserin von Deutschland, ein Bild der Kaiserin &c. Die Kaiserin (Königin) ist die Frau (Gemahlin) des Kaisers (Königs) von Deutschland (Preussen) &c.

Sie ist eine Prinzessin von Schleswig-Holstein.

Wer ist das? Was sehen Sie auf dem Bilde?

The above were practised with all possible variations and combinations.

Vocabulary. König (Königs), Königin, Kaiser (Kaisers), Kaiserin, Prinz, Prinzéssin, Preussen, Bild, Frau, Gemahlin—gut, (ein) gut*es* (Bild)—des (gen. masc. sg.), der (gen. fem. sg.)—es, sie, wer?—auch—von.

(**No. 8.**) *Apparatus*: as in Lesson 7.

This and the following lesson were devoted to the framing of sentences designed to familiarise the students with the declension of the definite and indefinite articles, both alone and in combination with adjectives. The sentences here recorded must serve as samples of a large number actually used. (Questions with wo? wer? wie viele? &c.)

Der Kaiser ist der Gemahl (von) der Kaiserin.

Der (deutsche) Kaiser steht auf dem Bilde neben der (deutschen) Kaiserin: die (deutsche) Kaiserin steht auf dem Bilde neben dem (deutschen) Kaiser: Hier ist der Kronprinz von Deutschland (Preussen)—ein deutsch*er* Prinz—der deutsch*e* Kronprinz. Er steht vor dem Kaiser, vor der Kaiserin.

[1] Such clumsy periphrases were used, perhaps too frequently, with the purpose of establishing the declension of adjectives by repeated illustration of the several cases.

Der Kronprinz ist ein Leutnant in der deutschen Armee (im deutschen Heere). (ein deutsch*er* Prinz, ein jung*er* deutsch*er* Leutnant).

Der deutsche Kaiser ist der Herr des deutschen Heeres[1]. Der Kronprinz ist ein Sohn des Kaisers und der Kaiserin &c. &c.

Vocabulary. Kronprinz, Leutnant, Gemahl. Herr, Sohn, Armee, Heer. Various new forms and combinations of article and adjective —jung—steh*e*, steh*en*, steh*t*—auf, neben, vor.

(**No. 9.**) (See remarks prefixed to Lesson 8.)

Die Mutter des Kronprinzen ist { eine deutsche Königin. / die deutsche Kaiserin. }

Wir haben hier ein deutsches Bild. Wir sehen darauf { einen deutschen König / den deutschen Kaiser } und { eine deutsche Königin. / die deutsche Kaiserin. }

Dieser junge Prinz ist der Sohn eines deutschen Königs, des deutschen Kaisers (von einem deutschen König, von dem deutschen Kaiser).

Er heisst Eitel Fritz und ist auch ein Leutnant in der deutschen Armee.

Fritz ist der zweite Sohn einer deutschen Königin (&c.). Sie hat sechs Söhne; sie ist die Mutter { der jungen Söhne. / von sechs deutschen Prinzen. }

Die jungen Prinzen sind die Söhne { des Königs eines deutschen / des Kaisers des deutschen Landes. / Reiches. }

Der älteste Prinz ist der Kronprinz { des deutschen Reiches. / eines deutschen Landes. }

Sehen Sie das kleine Kind? Das kleine Kind ist kein Prinz, sondern eine Prinzessin. Hier sehen wir die sechs deutschen Prinzen und eine kleine Prinzessin.

Vocabulary. All combinations of definite and indefinite article

[1] der oberste Kriegsherr, der Oberbefehlshaber.

with the adjective had been exemplified. New words were: Mutter, Söhne, Kind, Reich—zwei-t-e, ältest-e, klein-e (-es)—daráuf—sondern.

(**No. 10.**) (See remarks prefixed to Lesson 5.)

After the elucidation of further questions of pronunciation, the full declension of the definite and indefinite articles (with adjective) was deduced from sentences already acquired, and set on the board in tabular form (see next page).

The few differences between declension of *def. art.*+*adj.* and of *indef. art.*+*adj.* were pointed out, and the underlying principle explained.

The term "strong adjective declension" was also explained.

Students added to plurals in *-(e)n*, Augen, Prinzen, and to plurals in *-e* (with vowel-change) Söhne. The following points were also noted.

(*a*) feminine nouns unchanged in the singular (Hand, Kaiserin, &c.).

(*b*) there are two declensions, strong and weak.

(1) the weak takes *-(e)n* throughout: Prinz, Studént &c.

(2) the strong normally takes *-(e)s* in gen., *-(e)* in dat. Its plural ending is most commonly *-e*, vowel-change often occurring (Landes, Munde, Söhne).

(3) Auge is strong in singular, weak in pl. (ich sehe mit dem Auge: ich habe zwei Augen).

(4) Some strong nouns (hitherto dissyllables in -er) drop *-e* in gen. and dat. sing., and in pl., e.g. Kaiser &c.

(5) The dative pl. of declinable words ends in *-(e)n*.

(6) Change of vowel for plural always indicates *strong* plural, and is incompatible with weak ending *-(e)n* (but cf. 5).

Verb

ich	stehe,	spreche,	mache,	schreibe, sehe.
wir, Sie, sie	stehen,	sprechen,	machen,	schreiben, sehen.
er, sie	steht,		macht,	schreibt.

Prepositions with dat.: in, mit, von, auf, neben, vor.

sg.			pl.	
d*er* junge Prinz ein jung*er* Leutnant	d*ie* deutsche Kaiserin eine deutsche Königin	d*as* kleine Kind ein gut*es* Bild	d*ie* jung*en* Prinzen	N
d*es* deutsch*en* Kaisers ein*es* deutsch*en* Königs	d*er* deutsch*en* Kaiserin ein*er* deutsch*en* Königin	d*es* deutsch*en* Reiches ein*es* deutsch*en* Landes	d*er* jung*en* Söhne	G
d*em* deutsch*en* Kaiser ein*em* deutsch*en* König	d*er* deutsch*en* Armee ein*er* deutsch*en* Königin	d*em* deutsch*en* Reiche ein*em* deutsch*en* Lande	d*en* deutsch*en* Prinzen	D
d*en* deutsch*en* Kaiser ein*en* deutsch*en* König	d*ie* deutsche Kaiserin eine deutsche Königin	d*as* kleine Kind ein deutsch*es* Bild	d*ie* deutsch*en* Prinzen	A

(No. 11.) READING LESSON 2.

England hat ein kleines Heer, und Deutschland hat ein grosses Heer. Der deutsche Kaiser ist der Oberbefehlshaber des deutschen Heeres, und der älteste Sohn des Kaisers ist ein junger Leutnant. Der Kaiser heisst Wilhelm, und der Kronprinz heisst Friedrich Wilhelm. Der zweite Sohn, Eitel Fritz, ist auch ein Leutnant. Der Kaiser hat noch vier Söhne und eine kleine Tochter.

Hier ist ein gutes Bild (von) der deutschen kaiserlichen Familie. Der Kaiser Wilhelm steht darauf neben der deutschen Kaiserin. Die Mutter hat ein kleines Kind auf dem Arm. Das Kind ist kein Prinz, sondern eine kleine Prinzessin. Der junge Kronprinz steht vor seinen Eltern und hat ein Schwert in der Hand. Fritz sitzt auf einem Stuhle. *Ein* kleiner Prinz hat eine Trommel[1].

Der Kaiser ist auch der König von Preussen. Er wohnt mit seiner Familie in Berlin. Berlin ist eine grosse Stadt, die Hauptstadt von Preussen und auch von Deutschland.

The above *reading lesson* was carefully taken with each member of the class individually. Questions in German were then dictated, and the class wrote suitable answers in German opposite each question.

Vocabulary. Tochter, Familie (pronunciation!), Arm, Eltern, Schwert, Stuhl, Trommel, Stadt, Hauptstadt.—gross, kaiserlich, sein—ich sitze, &c., ich wohne, &c.—noch.

(No. 12.) *Apparatus:* as before.

(1) Es sind drei Soldaten auf diesem Bilde.
(2) Der älteste Soldat ist der Vater der zwei jungen Soldaten.
(3) Die beiden jungen Soldaten sind Brüder.
(4) Wie viele Schwestern haben die sechs deutschen Prinzen?
(5) Sie haben nur eine kleine Schwester.

Der / Ein } Satz, zwei Sätze...fünf Sätze.

Der erste Satz, der zweite...der fünfte Satz.

[1] i.e. in the picture before the Class.

Das / Ein } Wort, zwei Wörter...zehn Wörter.

Wie viele Wörter sind in dem ersten Satze? &c.

(Lesen Sie) das dritte Wort in dem fünften Satze, &c.

Der / Ein } Buchstabe, zwei Buchstaben, &c. &c.

Wie viele Buchstaben sind in dem sieb(en)ten Worte des vierten Satzes? (&c.)

Numerous similar sentences were practised in combination with *haben*, and in negative and interrogative form.

Vocabulary. Soldat (-en), Vater, Bruder (Brüder), Schwester (Schwestern), Wort (Wörter), Satz (Sätze), Buchstabe (Buchstaben)—(die) beid-*en*, erst, dritt, viert, ... zehnt,—nur.

The class was required to bring a series of written German sentences for the next time.

(**No. 13.**) (This lesson formed an introduction to the use of Verb-tenses.)

3×6=achtzehn, 4×5=zwanzig, 3×7=einundzwanzig, 5×5=fünfundzwanzig, 5×8=vierzig, 10×9=neunzig, 10×10=hundert.

Präteritum	*Präsens*	*Futurum*
25 Oktober 1893	26 Oktober 1893	27 Oktober 1893
der fünfundzwanzigste	der sechsundzwanzigste Oktober, achtzehn hundert drei und neunzig	der siebenundzwanzigste
gestern	← HEUTE →	morgen
Mittwoch	Donnerstag	Freitag
ich *war* gestern in Bangor	ich *bin* heute in Bangor	ich *werde* morgen in B. *sein*
er war, wir waren		er wird, wir werden
wir *hatten* gestern eine deutsche Stunde	wir *haben* heute eine deutsche Stunde	wir *werden* morgen eine deutsche Stunde *haben*

Vocabulary. Jahr, Monat, Tag, Stunde, Mittwoch, Donnerstag, Freitag,—achtzehn, zwanzig, zwanzigst-, vierzig, neunzig, hundert—ich war, er war, wir waren, &c.: ich hatte, er hatte, wir hatten, &c. ich werde haben, er wird sein, wir werden schreiben, &c.:—gestern, heute, morgen.

(**No. 14.**) This lesson was devoted to practising the matter of

the last lesson, and extending its scope over a whole week. For example,

sechs mal fünf ist dreissig.
Dienstag 24 Oktober, vorvorgestern.
Mittwoch 25 Oktober, vorgestern. } präteritum.
Donnerstag 26 Oktober, gestern.
Freitag 27 Oktober, heute. ... ... präsens.
Sonnabend 28 Oktober, morgen.
Sonntag 29 Oktober, übermorgen. } futurum.
Montag 30 Oktober, überübermorgen.

Wie viele Tage hat eine Woche?—Es wird in zwei Tagen Sonntag sein—Wir hatten in der letzten Woche fünf deutsche Stunden—Wie viele deutsche Stunden werden wir in der nächsten Woche haben?—Wir werden in diesem Jahre eine wallisische Universität haben—Morgen wird ein grosses Fussballspiel sein zwischen der Stadt Flint und der Stadt Bangor—Ich werde die neuen Wörter schreiben—Schreiben Sie alle für nächstes Mal zwanzig deutsche Sätze. (These sentences are a selection from those actually used.)

Vocabulary. Sonnabend, Sonntag, Montag, Dienstag, Spiel, Universität—neu dreissig, dreissigst-, letzt-, nächst-,—vorgestern, vórvorgestern, übermorgen, überübermorgen.

(**No. 15.**) (See remarks prefixed to Lessons 5, 10.)

The weekly review of grammatical facts included the following:—

A. The full declension of many nouns, e.g.

(1) der Monat (Monate), der Tag (Tage), das Jahr (Jahre); der Satz (Sätze: so Sohn), die Stadt (Städte: so Hand).

(2) der Soldat (Soldaten: so Prinz, Student), der Buchstabe, die Schwester (Schwestern), die Stunde (Stunden).

(3) Der Bruder (Brüder: so der Vater; cf. die Mutter, Tochter).

(4) Das Wort (Wörter: these modify where possible, Land, Mann, Kind, &c.)

B.

(1) sein like ein.

(2) the termination -lich in kaiserlich (kindlich, königlich).

(3) *ält*er, *ält*est.

(4) the further formation of cardinals; elf, zwölf...drei*zehn*... acht*zehn*: zwanzig[1], dreissig, vier-zig,...neun-zig, also ein *und* zwanzig, neun und zwanzig, drei und neunzig, &c.

(5) the formation of *ordinals* from cardinals, e.g. zwei-t, vier-t, zehn-t, zwanzig-st, dreissig-st, drei und zwanzig-st, &c.

C. Verbs. The formation of the future:

ich werde einen Satz schreiben | wir werden zwei Wörter schreiben.
Sie werden...schreiben
er wird.....schreiben | sie werden.....schreiben,

The past tense indicative has (practically) only one sing. and one pl. form.

D. While the indiscreet intrusion of any pretence of comparative philology was studiously avoided, there was sufficient material to illustrate the fact that English and German spring from a common stock. e.g. Stuhl, Schwert, Wort, Land: König, Mann, Vater, Mutter, Eltern, Sohn, Tochter, Bruder, Schwester; Arm, Hand, Finger; Jahr, Monat, Woche, Tag (Mittwoch, &c.); gut, alle, letzt, nächst—the numerals—haben, lernen, machen, sehen, sitzen, &c.—gestern, morgen, hier, &c. &c.

(**No. 16.**) The following was spoken to the class, every new word (italicized) being explained as reached.

Ich werde heute von einem *vormaligen* Studenten dieses "University College" sprechen. Er heisst Z—, und sein Vater ist ein Deutscher und wohnt in London. Dieser Student war ein junger *Freund* von *mir*, und *kam im April* 1889 mit mir *nach* Bangor. Er lernte *bei* mir *Altfranzösisch*, und *Lateinisch* bei dem Herrn Professor A—. Im Oktober *ging* er nach Cambridge und *trat als* Student in C— College *ein*. Er *studierte dort* Deutsch, *Italienisch* und Französisch, und machte im *Mai* des letzten Jahres sein *Baccalaureatsexamen*. Im *folgenden* Oktober (1892) besuchte er die deutsche Universität *Halle*. Die Stadt Halle ist in dem *Königreich* Preussen und *liegt an* der *Saale*. Ich war in diesem *Sommer* dort, *aber* er war *damals* in England. *Jetzt* ist er *wieder*

[1] Insist on the proper pronunciation *tsvantsig*: not *suuansig!*

in Halle, und wird in diesem *Winter* sein *Doktor*examen machen. Er wird dann Herr Doktor Z— heissen.

(The new vocabulary written on the board in the usual way.)

(No. 17.) Students had been required to bring a written (German) summary of the statement made to them last time. Several were read aloud and the necessary corrections made.

After further oral practice of the material, the distinction between strong and weak verbs was made clear.

	inf.	*prät.*	*part.*	*ind. präs.*
Starke Verba	kommen	kam	*ge*kommen	komme
	gehen	ging	*ge*gangen	gehe
	eíntreten	trat...ein	ein*ge*treten	
	liegen			liege
Schwache Verba	besúchen	besuch-*te*	-besuch*t*	besuche, &c.
	studíeren	studier-*te*	-studier*t*	studiere, &c.
	machen	mach-*te*	*ge*mach*t*	mache, &c.
	lernen	lern-*te*	*ge*lern*t*	lerne, &c.

The general characteristics of strong and weak verbs were pointed out, and the fact that infinitives which have not the chief accent on the first syllable omit *ge-* in the past participle.

The form *trat...ein* was noted, but its full explanation reserved until it could be compared with similar forms.

An exercise on tenses was given to be written for next time.

Vocabulary as before.

(No. 18.) READING LESSON 3.

Wir werden heute von der deutschen Universität Halle sprechen. Sie ist 200 Jahre alt. Im Jahre 1693 waren 765 Studenten dort. In der ersten Hälfte des 18ten Jahrhunderts war Halle die grösste protestantische Universität Deutschlands und hatte 1500 Studenten. Das Hauptstudium war damals Theologie. Napoleon der Erste suspendierte die Universität zweimal; vom 19ten Oktober bis zum 29sten Dezember 1806, und wieder vom 19ten Juli bis zum 23sten November 1813.

Die alte Universität Wittenberg ist seit dem Anfange dieses Jahrhunderts mit Halle vereint. Sie war der Mittelpunkt der deutschen Reformation. Luther trat im Jahre 1508 als Professor in Wittenberg ein und schlug neun Jahre später seine 95 Sätze (Thesen) an die dortige Schlosskirche an.

Halle hat jetzt 1522 Studenten. Studentinnen aber sind noch ausgeschlossen[1].

The above Reading Lesson was taken carefully with each member of the class individually, all new words being explained when first occurring[2]. The piece read suggested the following points:

(1)	*inf.*	*prät.*	*part.*
Stark	ánschlagen	schlug...an	an*ge*schlagen
	aússchliessen	schloss...aus	aus*ge*schlossen
Schwach	suspendíeren	suspendier*te*	-suspendiert
	vereínen	verein*te*	-vereint

(2) the respective uses of *vor* and *seit* (with Colbeck's diagram[3]):

vor fünf Jahren war ich noch in Cambridge.
seit vier Jahren bin ich in Bangor.

[1] Dr Breul points out that a more idiomatic expression is: werden noch nicht zugelassen.

[2] After the statement that English was (with a definite and specified exception) practically excluded during the whole course, it would seem superfluous to detail to experienced teachers the familiar devices adopted. An instance or two of "Anschauungsunterricht" will suffice. At the first occurrence of "ausgeschlossen" the class looked perplexed of course. Calling the one woman-student from her place, and (somewhat unchivalrously!) shutting the door upon her, I pronounced meanwhile the words: ich schliesse die Studentin aus...ich habe die Studentin ausgeschlossen...die Studentin ist ausgeschlossen. So, after an illustration of "Tritt" and "treten," the picture "ich trete ein"..."ich bin eingetreten" was supplied by my passage through the class-room door. Similarly with "anschlagen" by the help of a piece of paper and the blackboard.

[3] Colbeck, *On the Teaching of Modern Languages* (Pitt Press), p. 42.

vor drei Wochen begannen wir Deutsch.
seit drei Wochen lernen wir Deutsch.
heute *vor* zwei Tagen war Dienstag &c. &c.

(3) zum=zu dem, im=in dem: *an* governs two cases, e.g. die 95 Thesen waren *an der Thür*. L. schlug sie *an die Thür* an.

(4) Rule for gender of compound nouns: Mittelpunkt, Hauptstadt, Schlosskirche.

(5) adjectival ending -ig: dortig: hiesig, jetzig (not jetzt*i*g).

Vocabulary. Hälfte, Jahrhúndert, Haupt, Studium (and H-s-), Theologíe, Dezember, Juli, November, Anfang, Punkt, Mittel, Mittelpunkt, Reformatión, Kirche, Schloss (and Schlossk-), protestántisch, spät, dortig—suspendierte, vereint, schlug...an, ausgeschlossen—spät (später), damals, bis—seit (dat.), zu (dat.), an (acc. and dat.).

(**No. 19.**) The subject-matter of Lesson 18 was revised, with supplemental explanations, and much oral practice. Some important new points in 18 made it advisable not to push on too rapidly, but to bring stragglers into line.

(**No. 20.**)

An
Herrn Prof. Dr F. SPENCER,
in Bangor, Wales,
Grossbritannien.

HALLE a/S,
den 11*ten* NOVEMBER 1892.

LIEBER HERR DOKTOR!

Ich höre, Sie waren diesen Sommer in Halle und waren so gut nach mir zu fragen. Ich wohne hier in der Karlstrasse. Meine Wirtin ist alt, aber durchaus gutmütig. "Ein Freund meines Bruders," sagte sie mir, "kennt einen Engländer." "Dann können Sie mir vielleicht," sagte ich, "ein Bett auf englische Weise machen." "O ja, das kann ich wohl," war die Antwort. Ich wollte, ich könnte das Resultat photographieren!

Die Studenten hier trinken viel Bier. Es ist besser für den Magen als Thee; und die wallisischen Studenten tranken vor drei Jahren viel zu viel Thee. Trinken sie noch so viel?

Letzten Freitag besuchte ich zum ersten Mal einen Studentenverein, wo die Neuphilologen einmal in der Woche zusammenkommen. Wir tranken Bier, sangen, rauchten, und sprachen auch von unseren Studien. Die Professoren waren auch dabei. Ich trank zehn Glas Bier[1], und ging erst um halb zwei nach Haus.

Dieser Brief aber, lieber Herr Doktor, muss einmal zu Ende kommen.

Mit freundlichstem Gruss,
Ihr
Z.

The first paragraph of the above letter was read to the class—as far as *photographieren*—with explanations.

New points were the use of the past subj. as conditional (*ich wollte*, *ich könnte*), and the respective forms and uses of *kennen* and *können* [both these verbs having vowel-change and weak endings].

Vocabulary. Strasse, Wirt (-in), Mut, Bett, Antwort, Ohr (pl. Ohren), Frage—lieb, gútmütig—höre, fragen, kennt, sagte, können, könnte, kann, antworten, wollte (Kond.), photographíeren—so, durchaus, denn, vielléicht, wohl—durch (acc.), aus (dat.).

(**No. 21.**) The remainder of the letter was read, and new words explained as they occurred. The whole letter was then read through again, and, only when every part was thoroughly grasped by all, was a copy supplied to members of the class.

Each new verb was referred to its place among strong or weak verbs. The chief tenses of new verbs were also indicated and illustrated by short sentences.

The class was requested to work up the letter thoroughly for next lesson, for the purpose of being able to sustain a conversation arising out of the subject-matter of it, or to answer on paper questions bearing upon it.

[1] N.B. *zehn Biergläser*, but *zehn Glas Bier*.

Vocabulary. Bier, Magen, Thee, Verein, Philológ, Glas (Gläser), Brief, Ende, Gruss—besser, unser, Ihr, freundlich—trinken (trank &c.), zusammenkommen, sangen (&c.), rauchten (&c.), muss (&c.), sprachen (&c.)—wie, zusammen, dabei, erst—für (acc.), um (acc.).

(**No. 22.**) This lesson was chiefly devoted to questioning the class in German on the subject-matter of the last two lessons (i.e. the letter from Z— in Halle). The sentence: *ging um halb zwei nach Haus* naturally suggested a detailed explanation of the German system of reckoning the time of day[1]. A written exercise on this was set for next time.

Vocabulary. Uhr, Viertel, Minúte, halb.

(**No. 23.**) The German method of reckoning time was further illustrated, and some of the exercises discussed with the class. As a preparation for the treatment of Heine's *Lorelei*, the subjoined partial paraphrase was then read to the class, carefully explained, and questioned upon. The vocabulary having been given in the usual way, the class was required to write the substance of the paraphrase for next time.

Das Märchen von der Lorelei:—Die Lorelei ist ein schönes Mädchen mit goldenem Haare: sie sitzt oben auf dem Gipfel einer Klippe am Rhein, wo der Strom sehr stark zwischen hohen Felsen fliesst. Sie trägt blitzendes Geschmeide und hat einen goldenen Kamm in der Hand, womit sie ihr goldenes Haar kämmt.

(**No. 24.**) The remainder of the paraphrase (see below) was treated in the same way as the part already given, with vocabulary, and a table of new verbs. The manuscript of the whole paraphrase was then distributed for the first time, and the class read it in the past tense. (The word *sass* had to be supplied.) The class was directed to work up the whole paraphrase thoroughly for next time.

Dabei singt sie ein wundersames Lied mit gewaltiger Melodei (note the usual form Melodie !). Der Schiffer in seinem kleinen

[1] The blackboard was found very useful at this point.

Schiffe hört das Lied und sieht nur nach der schönen Lorelei hinauf. Er sieht sie so lange an bis sein Schiff an die Felsen stösst. Dann verschlingen die Wellen den Schiffer mit seinem Schiffe.

Starke Verba	fliessen	floss	geflossen	
	tragen	trug	getragen	trage / trägt
	ánsehen	sah...an	angesehen	sehe...an / sieht...an
	stossen	stiess	gestossen	stosse / stösst
	verschlíngen	verschlang	verschlungen	
Schwache Verba	blitzen / kämmen.			

(**No. 25.**) The attention of the class was called to the grammatical facts of the past fortnight's work, somewhat as follows.

Substantive.

(*a*) Feminines: sing. uninflected, pl. weak. [Hälfte, Reformation, Kirche, Strasse, Wirtin, Antwort, Frage, Klippe, Welle, Melodei.]

(*b*) Fels († Felse): Philológ (cf. Studént).

(*c*) Neuters: [e.g. Geschmeide, Schiff, Jahr, Jahrhundert, Bier, Resultát, Haar.]

(*d*) Masculines: [e.g. Punkt, Verein, Brief:—Mut, Thee.]

(*e*) Strong nouns with gen. *-s*, dat.—, pl.— except dat.) Mittel, Lehrer, Finger, V*a*ter, Br*u*der, M*a*gen, Märchen, Mädchen, Gipfel, Schiffer, Kaiser. N.B. *-el*, *-en*, *-er*.]

(*f*) Masc. monosyllables with Umlaut: [Sohn, Kamm, Gruss, Strom: BUT Punkt, Tag.]

(*g*) Dissyllables in *-el*, *-en*, *-er* often have Umlaut. [e.g. Vater, Bruder, Magen.]

(*h*) Strong nouns with pl. in *-er* (dat. *-ern*) take Umlaut, where possible: [Mann, Bild, Glas, Haupt, Haus, Kind, Land, Lied, Schloss, Schwert, Wort, &c.]

(*i*) Strong in sg., weak in pl. [Bett, Auge, Ende, Ohr].

(*j*) Note Stŭd*ien*: and the function of *-chen*.

Adjective. (*a*) lieb*er* Herr Doktor: mit gewaltig*er* M.: blitzend*es* Geschmeide. (*b*) as adverbs. (*c*) participles as adjectives. (*d*) mein, unser, sein, ihr, Ihr, ihr. (*e*) bess*er*, stärk*er*, freundlich*st*. (*f*) declension of hoch.

Pronoun. (1) ich, mir, mich. (2) Sie, Ihnen, Sie. (3) er, ihm, ihn: sie, ihr, sie: sie, ihnen, sie.

Verb. (*a*) *Strong*: kommen, kam, gekommen [sprechen, beginnen]. treten, trat, getreten [sehen, lesen, liegen, sitzen (sass, gesessen)]. fliessen, floss, geflossen [schliessen]. tragen, trug, getragen [schlagen]. stossen, stiess, gestossen: gehen, ging, gegangen: schreiben, schrieb, geschrieben: trinken, trank, getrunken, [singen, verschlíngen].

(*b*) *Weak*, numerous examples.

(*c*) müssen, kennen, können, wissen.

(*d*) note past participles of vereínen, studíeren, &c., and of verschlíngen.

(*e*) the anomalous presents: will, muss, kann.

(*f*) trägt, schlägt, stösst, tritt, sieht, spricht.

(*g*) conditional or past subjunctive = past indicative in weak verbs: in strong verbs add *-e* and change root-vowel (numerous examples).

(*h*) separable prefixes bearing accent [eíntreten, aússchliessen, ánsehen, ánschlagen].

(*i*) formation of perfect [*bin* eingetreten, habe gesprochen].

Prepositions and their government: mit, von, bei, seit, nach, aus, zu.—für, durch, um.—an, in, vor, auf.

(**No. 26.**) This lesson was devoted to thorough oral practice of the material contained in the Lorelei paraphrase. It was also read in the past, future, perfect.

(**No. 27.**) "Heinrich Heine war ein berühmter deutscher Dichter und Prosaiker. Er wurde im Jahre 1799 geboren, und starb im Jahre 1856. In einem seiner bekanntesten Gedichte besingt Heine die Lorelei."

This brief exordium understood, the first verse of Heine's *Lorelei* was read, and the new words carefully explained.

Vocabulary: Dichter, Prosáiker, Gedicht, Zeit, Sinn—traurig, berühmt—geboren, bekannt, besingt, soll, starb (*e*, *a*, *o*, stŕbt)—dass. A written exercise was set for next time.

(**No. 28.**) The rest of Heine's *Lorelei* was communicated and explained. A copy of the whole poem was then for the first time supplied to each member of the class.

Vocabulary: Luft, Abend, Schein, Sonne, Jungfrau, Weh, Riff, Höhe, Kahn—kühl, ruhig, wunderbar, wild,—dunkelt, funkelt, ergreift, schaut, glaube, gethan.

CHAPTER IV.

ENGLISH.

THE problem of teaching English, as a language, to English boys and girls, arises out of (1) its phonetic peculiarities, (2) its grammatical structure, (3) the origin and development of its vocabulary.

Why it has to be taught.

(1) If each elementary sound were represented by one distinct letter, the spelling-book would be superfluous; if the incidence of the accent were fixed and uniform, practice in reading would be required only as a department of elocution and rhetoric.

(2) If the process of inflexional disintegration which our tongue underwent through some thousand years had gone on without being arrested or interrupted, accidence would occupy very little space in our grammars. The steady process of casting off inflexions and simplifying diversity, which continued till about the 14th century, has ceased indeed in the literary language, but there are indications that in the speech of the people the tendency still prevails, if the actual process be to a great extent arrested. The tendency of the uneducated appears to be always to reject or confuse inflexions of conjugation,—to say '*I be*,' '*he do*,' '*he done it*,' '*I seen him*,'—thus disregarding formal distinction between persons, and between the past tense and past participle. Hence the teaching of Grammar operates to save us from having two dialects, one colloquial, the other literary.

(3) While the intricacies, trifling as they are, of our grammar tend to make English to a certain extent a dead language to the uneducated, the highly composite structure of our vocabulary tends to make it in some respects a foreign language even to some who are not in the ordinary sense uneducated. Such an expression will hardly appear too strong, when we think of the enormous disparity between the few hundred words which a farm-labourer has at command, and the tens of thousands employed in a library which is fairly representative of the culture and scientific research of the age, and when we bear in mind the many gradations between these extremes, and reflect that all gains to what might be called each person's every-day stock of expressions must be acquired by the same process as if they belonged to the vocabulary of a foreign tongue. A discourse on philosophy is unintelligible to many, one on science to still more; and so of the various other branches of specialized knowledge. We have, in fact, hosts of *departmental* words, e.g. in Philosophy, *subjective*, *etiology*, *enthymeme;* in Science, *coefficient*, *polarized*, *allotropic*, and so forth. Nay more, elevated prose, and, still more, poetry, have a language of their own, which must also be acquired before the first step towards their appreciation can be taken. Indeed, it may be questioned whether any living Englishman knows the meaning of every term which is familiar to some section or other of his countrymen.

Within what limits it may be taught.

Now it is manifest that this vast array of English nomenclature cannot be taught at school by any method like that of the spelling-book or dictionary. It would indeed be absurd to attempt to burden the memory with much that could only be of use if learned for use, and learned at the time when it was wanted. Practically, the teaching of English, as a language, must be limited to (1) the English of cultured social intercourse, (2) literary English, that which opens the treasure-house of

books. It is, of course, obvious that the teaching of the latter is to some extent included in that of the former, which, in its turn, is ideally best acquired by social intercourse in cultured surroundings. But in the case of many pupils, the conditions for this are not perfect, and, at best, they are rarely adequate to the needs of persons who are still of school-age. Hence, to economize time, and to eliminate the errors incident to the tentative and imitative process, the English of expression (i.e. of conveying one's thoughts to others by speech or writing) is largely taught by the inculcation of principles rather than by practice, whence arises the necessity for Grammar.

The Teaching of Grammar.

Grammar is badly, is unprofitably taught, when principles are drilled into the pupil before practice. Definitions, classifications, rules, should be the crystallization of results to which he has been guided by methods every step of which has been made plain to him. It is a good plan for the teacher to lead his pupils on, in a sort of fraternity of investigation, to the independent framing of definitions and rules. So they will learn that thought and speech are the masters of Grammar, not Grammar of thought and speech. Hence, in the teaching of English, the early stages should consist mainly of Reading, and of such inculcation of principles as can be simply and naturally connected with it. Young pupils who learn the powers of words and their modification and arrangement in the expression of thought from observing them in actual operation, and that too in connection with what in itself excites interest, as a story or a poem, who see them, in fact, in the act of performing their functions, will be more likely to understand and remember, and to regard them as living things, than if they learn by committing to memory definitions, illustrated by examples having no interest in themselves and no connection with each other. It is the difference between learning Botany in fields and woods, and learning it from a text-book and specimens

dissected on the desk. In the latter case the pupils seem to cover more ground and to learn more methodically, but in the former they comprehend, and they do not forget.

Reading.

Moreover Reading, that is, reading aloud, is in itself a most valuable training, which is still too much neglected in secondary schools, and by no means always well taught in primary schools. The atrocious fashion in which too many educated men—even those with whose professions bad reading should be incompatible—read, is a standing reproach to our system of higher education. It is to be feared that the disuse of a good old practice almost universal a century ago, that of reading aloud in the family circle, which has been crowded out in this leisureless age, has contributed to this deplorable result. In reading, as taught (if it be not gross flattery to apply the term to such a process) at schools, little beyond correctness of pronunciation and distinctness of articulation is insisted upon, whence results that wearisome monotony of enunciation which we now instinctively associate with the delivery of sermons.

Provincialisms, and, still more, cockneyisms of pronunciation and intonation must be sleeplessly watched for, and promptly and unweariedly corrected. Alas! too often primary teachers themselves are steeped in cockneyism, and are unconscious that the pronunciation is not as unexceptionable as the sentiment, when to 'the hungry sheep' they dictate

> 'Soon as the evenin' shides previle,
> The moon tikes up the wondrous tile.'

The choice of reading-matter is by no means unimportant. If the teaching of English is to contribute (as it certainly should do) to a process of steady development and continuous education, the early stages should have reference to the later, and lead up to them. It would be well, therefore, that the text-books placed in the hands of the pupils should contain

nothing that is not worthy to be called 'literature.' Pupils must be young and dull indeed if they cannot be interested in episodes in the lives of the 'smiths of their mother-tongue,' and in passages from their writings. In any case it would seem better that the reading-matter should be continuous in scope and interest, than that it should consist of short disconnected fragments of anecdote and description. Picturesque and graphic readings from history, rather in the 'historical-novel' style than that of the conventional history-book, geographical readings, narratives of discovery and adventure, of travel and commerce, the fairy tales of science, systematized into a series,—some such courses as these might not only have the advantage of connectedness, but would also go far to justify the giving up of more time than has been usual to this threshold-stage of English teaching. Moreover, of disconnected reading there is only too much always accessible; and a great pity it is that so many thousands of government-educated people appear to have learnt to read only to devour scraps of sensational trash, columns of jokes, fragments of disconnected 'useful information,' whilst others limit their reading to newspapers. A school-course should, so far as possible, provide an antidote to a habit of mind which there will be no lack of outside influences to foster. On the other hand, reading-books should be no mere compilations in which the presentment of information is made the paramount object. They should be such as to awaken a *taste for reading*, should be interesting, nay, fascinating; they should be in their style a not inadequate introduction to English Literature.

I should not recommend the reading-lesson being broken up at every few minutes' interval by grammatical exercises in accidence and syntax. There is something irritating and adverse to sustained attention in continually breaking off an interesting description. Let such exercises come for an allotted

and understood period at the end of each (or every other) reading-lesson.

Technicalities of Grammar.

Having thus begun by introducing our pupils to the austerities of grammar in pleasant company, we may hope to find in them both more readiness and more aptitude for grappling with the subject as a substantive science. For we must not forget that grammar is a science, and by no means the easiest. Its very definitions, which encounter us on the threshold, enunciate general principles expressed in technical and abstract terms. It is, in fact, quite as much a study for older pupils as Algebra and Euclid (and, I might add, Logic) are. Indeed, as it is, advanced pupils are, as a rule, constrained to begin it *ab initio* in the higher forms, where they discard the elementary grammars on which they were suckled, and begin again at the beginning with larger text-books, sometimes having actually to unlearn definitions given in the discarded work, in favour of more scientific or more comprehensive ones.

It is part of the hard lot of the latter-day schoolboy, that, while the number of subjects demanding attention is larger than it was in his father's day, each subject, as a rule, claims for itself more time than of old—if, that is to say, the victim is to be 'up to examination standard.' Grammar is no exception. The text-books are bigger than they were; definitions are made longer and more involved by a hopeless striving after exact precision and comprehensiveness; classification-lists are portentous in their length and minute distinctions; matter is introduced which properly belongs to a history of the language or even of its literature, and which can be but fragmentary in its new connection. The Grammar has in fact become a reference-book, which many teachers nevertheless, slaves to the system of putting new wine into old bottles, labour to make their pupils absorb in painful gobbets on the old by-rote plan. Considering how much ought to be included under the head of

'English teaching,' the object of teachers and writers of school-grammars should be rather to minimise the strain on the memory, seeing that the aim of a cultured English scholar is not so much to name his tools as to use them.

That special department called 'Analysis of Sentences' has been elevated into a sort of fetish by the labours of grammarians and the exactions of examiners: its distinctions have been elaborated and refined, till, from being an aid to clear thinking and lucid expression, it tends to become a bewilderment to the intellect and a weariness to the soul. The practice of analysis of sentences is invaluable as a critical instrument for testing a writer's clearness in thinking and lucidity of expression, but, to serve this end, it must not be cumbrous. Pupils should by its aid be taught to dissect sentences, to detect the causes of obscurity, ambiguity, and other faults of style due to looseness of thinking. Hence it would be well for the teacher to make a practice of noting any examples of such faults which he may come across in his reading, with a view to anatomizing them in co-operation with his class. Pupils would then be led to discern some use and object in a department of their grammar which at present they are prone to detest as purposeless hair-splitting, and might become more alive to errors of speech, after helping to pillory popular or pretentious writers for such offences.

The function of English Grammar, so far considered, has been, in connection with reading, that of a chart, in connection with speech, that of a flywheel. But it must also discharge a nobler office, that of a handmaid to the expression of thought. Just as no one can be said to have acquired a foreign tongue till he can speak and write it, so we are but half masters of our own tongue if we cannot use it for the expression of our ideas with clearness, logical precision, and grace. Hence the practice of Composition should be begun early, and never discontinued. It is a pity

Composition.

that it should so often be dropped from the curriculum of the higher forms, partly because crowded out by subjects assumed to be of more importance (especially for examination purposes), partly from a vague impression that the large amount of written answers rendered by upper students is in itself a substitute for composition. But, unhappily, the form in which these answers are couched, so as to pay best, so as to convey the greatest number of 'points' in the briefest space, is directly opposed to the formation of anything worthy of the name of style. Indeed, if the average examiner finds a candidate indulging in anything like style, he immediately suspects that it is a cloak for his ignorance. A third reason may be that the practice of translating the masterpieces of classical literature is supposed to develope a taste and discrimination in the use of our tongue which is more than an equivalent for essay-writing. This is, under the best conditions, true only so far as relates to the choice of words; but that is only one part of Composition, and scarcely the chief part.

Beginners should not be expected to make bricks without straw—to write without preparation on such themes as 'courage,' 'patriotism,' nor, till we know that they have cultivated the faculty of observation, on 'a walk in the country,' and the like. We must not expect them to do two things at once, to quarry ideas out of their minds, and to erect a building with them at the same time. Supply them fully with something to say, that at this stage their one study may be how fitly to say it. A short story, a poem, to be reproduced in their own words, is an easy and natural first step. They may be shown how the same event may be differently described by reading to them a description of it by different hands, e.g. of the fight at Sedgemoor, by Hume, Macaulay, and Conan Doyle (*Micah Clarke*). An easy step in advance would be that they should write down their own reflections on a piece of description calculated to excite strongly their imagination.

For instance, read them a graphic account of a shipwreck, and tell them to describe the scene of consternation and grief in the home of the relatives of one of the victims, on the arrival of the news. As a further step, a subject might be given, and its treatment sketched out co-operatively, *viva voce* suggestions being received from pupils, written on the blackboard as received, and then arranged in the most logical order for working up into the essay.

Should 'flowery' writing be discouraged? Well, some discrimination, sympathy, and tact, are needed in this connection. We ought to distinguish between honest attempts at vivid or high-wrought description, and mere verbiage, such as the broadcast sprinkling of adjectives amongst the nouns. We should strongly encourage every effort to use the imagination, or to give play to the emotions. Above all, never be sarcastic upon a young essayist's early endeavours to soar above the prosaic, even if his attempts take what seems to you a very hackneyed form. It is probably not hackneyed to him. It is easy to make cheap fun of juvenile 'gush'; but there is something unchivalrous, something contemptible, in abusing the trust of a boy who has, in effect, put himself at your mercy. He has a right to something more than cold justice. If there seems to be a danger of the acquisition of a vicious style, certain flourishes, exordiums, perorations, or quotations might be tabooed, fair notice being given that their employment will entail loss of marks. It might be of advantage, so as to lead pupils to draw upon all the resources of their vocabulary, to give them occasionally an opportunity of writing in their most elevated style, having at hand at the same time the antidote to extravagance. Take a passage of high-wrought description, or of impassioned emotion, from a first-class writer; give the pupils simply the ideas and their general arrangement, and require them to express them in the most glowing language at their command. Then, when

the result is before them, turgid, no doubt, and meretricious enough, set before them the original: go through it with them sentence by sentence, explaining how grace is consistent with simplicity, and beauty with self-restraint, showing the exact appropriateness of individual words, the art concealing art in the balance of clauses. Such a method will do more towards teaching them to avoid false sentiment and tawdry ornament than any amount of ridicule, which makes the average boy shrink into his shell, and scares him from attempting anything outside the safe dulness of matter-of-fact.

The practice of composition might well include Correspondence, social and even commercial. Specimen letters in the conversational style of description might be given as models. Swift, Pope, Gray, Cowper, Byron, and many later writers supply examples in abundance. The father who complains, 'My son has been receiving a high-class education all these years, and now can't write a decent letter,' has right and reason on his side.

Faults of style—ambiguity, tautology, misuse of metaphor, jingling assonances, and so on—should be watchfully corrected. 'Awful examples' might be recorded in a notebook, for quotation as warnings. So obtained they will serve the desired purpose more effectually than if culled from books.

Prosody.

Not the least singular of the anomalies in modern grammar-school education—survivals from a time when education, if narrower in its scope, was in some respects more logical in its methods—is to be found in the assiduous practice of Latin, and even of Greek, verse-making, by pupils who not only never attempt, nor are advised or guided to attempt, a line of English verse, but whose knowledge of the technique of English verse, and appreciation of its niceties, is absurdly out of proportion to their mastery of classical prosody. One consequence is that these students can read Horace or Euripides better than they can

read Tennyson or Shakspere. To read English poetry, especially lyrical, so as to give the metrical effect, without turning the music into a sing-song of monotonous cadences, undistinguishable from doggerel, is probably a far less common accomplishment among University scholars, than to do the same for the classical poets. Among the non-classical public who have not even received the modicum of instruction which enables a reader to recognise the metrical form employed by a poet, it may fairly be said that there obtains a general ignorance of the very alphabet of poetry. Yet a moderate amount of attention to this department of education would qualify pupils to comprehend and appreciate the fundamental characteristics of verse. Surely it might well be the care of those who profess to impart an education in English, that their pupils should gain at least such an insight into the technique of poetry as might save them from stumbling on its threshold through blank ignorance of the essentials of metre, of rhyme, of harmonious cadence, of what differentiates correct verse from doggerel. Such terms as *caesura*, *alliteration*, and *assonance* should not be as strange to English boys and girls as if they were part of the nomenclature of some recently developed science. The confession, not uncommonly heard from respectably educated persons, that they 'have no taste for poetry,' proceeds in many cases not from a deficiency in ideality, nor from a lack of that power of sustained attention which poetry demands, but oftener perhaps from the fact that the distinctive *form* of poetry, by which it first arrests the cultured reader, is for them simply an initial difficulty: it is a distracting element which tends to worry such readers in their endeavour to take in the author's meaning. They are somewhat in the position of a man with no ear for music, who would rather dispense with the accompaniment to a song in the sentiment and expression of which he is interested. For such readers—and our schools are indirectly increasing

their numbers yearly—Milton, Wordsworth, Tennyson exist only as thinkers; as poets, as artists, they have lived in vain.

The foregoing pleas for attention to somewhat neglected features in Education presuppose a relaxation of the present bondage to examination-trammels, and to the authority of the inspector, as it has been too often exercised. The examiner cannot, it may at once be granted, so readily, and with such machine-like rapidity, gauge the progress of pupils so trained. It is easy to examine in formal rote-work, in parsing, analysis —in engine-turned acquirements; less easy to appraise culture. Yet the object of a country in giving such education to its youth is not that examinations may be passed, and reports filled up, and averages attained, but that the rising generation may learn to speak and write as cultured people, and may appreciate the treasures of our literature, so that their great heritage may be to them something more than a name. The present result is that pupils glibly define, classify, and quote rules which they disregard in their own persons, because they get too much principle and too little practice. Smart board-school pupils grow up under this system with the vicious pronunciation and the uncultured daily speech of their social environment, and become teachers themselves; and, as London turns out the largest supply of the finished article, the country is sown broadcast with cockneyisms.

History of the English Language.

But however familiar the learner may be made with the capabilities of English speech, and however expert in its manipulation he may become, he has but gained a half-acquaintance with our tongue if he knows nothing of its history and development. A knowledge of the past of our language is indispensable to the right understanding of its present. To the latter the school grammar must necessarily be almost limited; but there is no lack of excellent works which treat the subject with that fulness which is requisite for interest, without erring on the side of philologi-

cal abstruseness. Trench's works on *The Study of Words* and *English Past and Present* were almost the pioneers in this department, and still (supplemented by the teacher's own gleanings in more recent research) may serve as admirable reading-books for higher forms. By progressively arranged specimens of English, illustrating the changes and development of the language, pupils will readily learn that between their own speech and that of Layamon and Robert of Gloucester there is no great gulf fixed; and a little practice will make Piers Plowman and Chaucer not only readable but interesting. The past of English will gain a more vivid interest for them if they learn that that past is not dead, that there still linger on the lips of some of their countrymen survivals of the old dialects; and what they have been wont to smile at as Yankee slang will wear a new aspect for them when they know that many of its quaintest and raciest expressions passed over with the Mayflower nearly 300 years ago to the land that cherished them long after their birth-land had forgotten them.

English Authors.

While Composition is necessary to the student that he may acquire practice in handling his native tongue, and Grammar, that he may avoid errors in its use, he will be like an art-student who neglects the works of the Old Masters, if he does not make a careful and detailed study of some portion of the work of those great writers who have attained perfection, or something approaching it. Such a work will be an object-lesson without which precept and practice will be futile. It was, therefore, a great step in advance when this became a permanent feature of the English curriculum in secondary schools. It is not easy to overrate the gain in mental culture to a pupil who minutely and intelligently studies, say, a play of Shakspere. By committing to memory choice passages, he stores his mind with what is worthy to be a possession for ever: by learning from what sources the poet obtained the plot of his drama, he may in some degree

appreciate the alchemy which transmuted dross to fine gold: he may hear what great critics have written concerning the character-painting which gives such marvellous life and individuality to Shakspere's *dramatis personæ:* he may be told something of the poet's contemporaries and of that mighty awakening of English Literature, when the young Titan first felt his strength, and was flushed with the life of a new-dawned faith. Attention to the peculiarities of Shaksperian grammar will give him some insight into the history of the language. So, from the intelligent reading of one play, he will learn how to read an English author profitably. But it is not necessary that, in order to reap very substantial benefit, he should undertake anything so ambitious. How much may be got from one short poem, how instructive, how suggestive, how quickening it may be made, is shown by Hales' treatment of the ballad of *Rosabelle*, in his preface to *Longer English Poems.*

The grand principle, in the choice of authors, in the selection or recommendation of text-books, in the method of teaching—and, therefore, in the method of examination (since the examiner to a large extent prescribes to the teachers the lines on which they must teach)—is to foster a *liking* for the work of great writers. Hence those who have the choice of books, or the power to impose their preference on others, should be careful not to repel young students on the threshold of their acquaintance with English classics. 'You may,' Mr Goschen has observed, 'drive people into working harder, but the results will disappoint you unless you make them fond of work. Greater knowledge is good, but there is a higher ideal—greater love of knowledge.'

It is to be feared that this principle has not always been kept in view by those who have prescribed the English author subjects for thousands of boys and girls during the last quarter of a century. Those chosen by examining syndicates have been sometimes lacking in interest for young readers (e.g.

Vanity of Human Wishes), or have been vicious models (e.g. *Annus Mirabilis*), or in conception and treatment over the heads of boys (e.g. *Adonaïs*). Seldom, to conjecture from the choice made, has the thought been present to the mind of the examiner:—'This may prove for some thousands of boys their first introduction to an English classic; it ought therefore to possess for them something of charm, of fascination: they should be led to think of the writer not merely as a consummate literary artist (a character which they can at this stage but half appreciate), but as a great Englishman who loved England, as one who saw in nature the light that never was on sea or land, who felt in humanity that touch of nature which makes the whole world kin.' So for one year there might be set a series of great patriotic ballads, as (Drayton's) *Agincourt*, *Hosier's Ghost*, *The Revenge*, *&c.*; for another, a collection of idyllic poems, as *The Deserted Village*, *Dora*, *Evangeline*; for another, one or more of the Romantic school, as *Marmion*, *The Giaour*, or a selection from *The Earthly Paradise*; or, again, a representative collection from Tennyson's shorter poems, or one of the *Idylls*.

It is to be regretted that the particular editions of Shakspere's plays most authoritatively recommended for middle-class examinations are rather adapted for students (who need also to be discriminating students) than for beginners. It is something like giving a stone to one who asks bread, when a reader who wants to understand something of the spell of Shakspere's influence, something of the life and thought of his time, something of the truth and beauty of the characters which he portrays, something of his revelation of the workings of the human heart, something of the magic of his music, of the cunning of his art, finds in these editions no guidance whatever to the artistic, literary, and ethical significance of the dramatist's work, but a wilderness of philology, a lumber-room of cross-references, a jungle of quarto- and folio-readings and commen-

tators' emendations, a mingled mass in which he has to grope, without even the help of an index, for the small fragments which can be of any use to him in interpreting the text and understanding the allusions. In this unmethodical jumble of the essential and the superfluous, of elementary explanation and advanced textual criticism, he knows not what to omit, and what to lay, a heavy load, upon his memory. Surely, some method, some distinctive clearness of arrangement, is not too much to require in a book which pupils have to 'get up' under pressure, and in a limited time.

As it is too bad that gems of literature should be degraded into puzzle-quarries, I would suggest that examiners be precluded from setting, for parsing or analysis, passages taken from the authors. The present practice leads to hours and hours being spent in picking harps to pieces, not even to find where the music comes from, but to see how the materials are fastened together. Let these works be studied *as literature*—to educate appreciation, to foster taste, to quicken the instinct of ideality, and to stimulate that imitative tendency by virtue of which the literature of each successive generation enters into the labours of the past.

No writer, however great, stands alone; he is the child of his age; he has many younger brothers: therefore some knowledge of the author's personal environment, of his other works, of his age and his contemporaries, should be required as part of the intelligent study of the special work prescribed.

History of English Literature.

Hand in hand with the minute study of a portion of one English classic, should be taken the History of English Literature. This also, in choice of text-book, in method of study, in selection of illustrative extracts, should, for beginners especially, be before all things interesting. It should be connected with the history and social life of England. Merely to mention such names as *Brunanburh*,

Caedmon, *Piers Plowman*, *Chaucer*, is to summon up a series of visions of the spirit of age succeeding age, of the deep heavings of that great sea upon whose wave-crests flashed for a moment Alfred, Dunstan, Wyclif, and Wat Tyler. The more we can show how on every period of our history its literature throws a living light, the more nearly shall we realize our ideal—to create a taste and desire for further reading, without which our teaching is nugatory, since little ground can be actually covered at school, and that little will be lost if not extended afterwards. The Literature chapters in Green's *Short History* are good examples of the interesting method of treating a period. Epitomized histories of literature, loaded with dates and lists of works, are worthless: writers and their works must not be *names*, but living men and vivid pictures. Hence a first course of literature should comprise few names, but those the greatest, that scope may be given for adequate handling and abundant illustration by extracts. Admirably as Stopford Brooke's primer is written, it would, as a primer, be better if it were fuller in its treatment of the chief writers, even to the omission of minor ones. Moreover, a beginner's book on English Literature is not complete without some detailed account of the works mentioned, and specimen extracts. There is a *Biographical History of English Literature* in Dr Morell's English Series, which, as a teacher's handbook, seems to be less known than it deserves to be. Each chapter is followed by a set of exercises on the illustrative passages which have been quoted, exercises admirably adapted to stimulate and guide the critical and aesthetic faculty of young readers. But no handbook of reasonable size can adequately illustrate literature by specimens, since even good ones must needs be short. It devolves upon the teacher to supply longer, and, it may be, more characteristic ones.

I am not sure that the chronological method of 'beginning at the beginning' is the best in this study. It does seem

reasonable that boys should be first introduced to the writers who are now 'making history' in Literature. The arguments urged for commencing the study of Geography by familiarizing the learner with the topography of his own neighbourhood apply with yet more force to Literature. It is a curious thing that many of that large class of people whose education practically ended when they left school, know more—little though that be—of the writers of Shakspere's and Addison's days than of the makers of modern English. They have learnt in school-books (e.g. in the literary appendices to history-periods) the titles at least of Chaucer's and Jeremy Taylor's writings, but could not name a work of William Morris or Ruskin.

Contemporary Literature.

It is scarcely necessary to add that the study of our literature, not only as a story of individual achievement, but also from the point of view of its development in epochs and 'schools,' cannot be left out of a reasonably complete school-course.

It may be objected that attention to all the above-mentioned points in the teaching of English must absorb too much of the time available for the entire curriculum. Not so very much, if drudgery-drill be shortened, with its rote-work of definitions, lists, and so forth, details which are crammed for examination purposes, and will not abide in the memory, which is indeed better disburdened of them. In fact, this bondage to examinations, which has sometimes meant bondage to the indolence of examiners who find it easier, in setting questions, to stick to the old ruts than to move with the times, is the real lion in the path of reform. Besides, the question is really one of appraisement of values. As matters are now, pupils leave the highest forms of schools, and young men leave the University, with a little Classics, Modern Languages, Mathematics, and Science, but probably less of English, in the true sense, than of any. Besides the disgrace which should attach to ignorance of so

great a heritage, there is also the risk that, just as it seldom happens that people continue the study of a subject begun at school unless it has been carried far enough to arouse intelligent interest and surmount initial difficulties, so our English students, not having obtained a master-key to the treasure-house of our literature, may become undiscriminating readers of ephemeral productions, of what is read without an effort and forgotten as soon as read; that, having no cultivated perception of the characteristics of really good literature, no high standard permanently set up in their minds, they may be swayed by each new fashion, and be captivated by each new craze, in literature. It will be little to the credit of the educational system of the future if it furnishes no corrective to such tendencies, if it does nothing to create true students, who will regard their education as having only commenced when the school-course ends. Yet those whose study of English is confined within the narrow limits of the traditional school-course are most unlikely to extend their reading in what has awakened in them so little interest, has given them so little capacity to understand and appreciate. About the classics, even about 'the hard-grained Muses of the cube and square,' there lingers sometimes a curious fascination, even when it is based on nothing higher than the pride of pedantry in the one case, on the pleasure of intellectual gymnastics in the other, but what adult ever amused himself with practice in parsing or analysis, or desired to recall his subtle appreciation of the distinction between the gerund and the verbal noun? We have long since, in theory, left to fashionable mammas the notion of young people 'finishing their education' at school, but we have advanced little further in practice, if we feed them on dry husks of knowledge to which they will never again turn of their own accord; and if we convey to them no inkling of the beauty, of the glory of that legacy of thought and eloquence and song which is theirs. In the words of the statesman

already quoted, 'It is little enough that our schools and colleges, even of the highest order, can teach directly. But they can develope in their scholars a capacity, and inspire an interest, which will cause them to go on through life teaching themselves.' The educators of the future can cherish no nobler ambition, can propose to themselves no higher ideal.

CHAPTER V.

HISTORY.

Should History be taught? Opposite views.

THE determination of the true place of history in a sound system of education is a matter which has given writers upon education considerable trouble. According to one writer, history is 'the most difficult subject with which the educator has to deal[1],' a conclusion which is certainly suggested by the conflicting views of those who have sought to appraise its educational value. The futility of teaching history has been pointed out in most emphatic terms, in terms, in fact, only less emphatic than those which have been employed to describe its charm and its value as a subject of study. Systems of education which have had as their object the training of men in obedience to an external authority have shunned history as a dangerous solvent of received opinions: there was no room for history in the schools of the Middle Ages, and it found no place in the curriculum of the earlier schools of the Jesuits. A saying is indeed recorded of a Jesuit father—'History is the destruction of him who studies it[2].' On the other hand, several modern writers of great weight and influence have condemned history, not as pernicious, but as useless, devoid of educational value. Bain would, on the whole, relegate it to the University[3],

[1] *Cyclopædia of Education*, Kiddle and Schem (1883), p. 423.

[2] Compayré, *Histoire des doctrines de l'éducation en France* (1885), i. 188.

[3] *Education as a Science*, London, 1892, pp. 286—7.

and Herbert Spencer complains, in well-known words, that 'Scarcely any of the facts set down in our school histories..... illustrate the right principles of political action.' They are 'unorganizable facts.' 'Read them, if you like, for amusement; but do not flatter yourself they are instructive[1].'

In sharp opposition to these views are the commendation bestowed by Montaigne upon history as a means of moral training[2], and Locke's opinion that 'as nothing teaches, so nothing delights more than history[3].' Just as the study of history has been discouraged by those who have had an eye to the stability of ecclesiastical institutions, so it has been fostered by the men of new ideas. The Renaissance patronised it in the person of Æneas Sylvius[4] and the Reformation in that of Luther[5]. True, Rousseau had no respect for history, no belief in its power to teach anything save the power of human craft and selfishness[6], but he was the intolerant preacher of a new dogmatic system, not the apostle of free enquiry. Modern educational reformers have for the most part been quick to recognize the value of the stored-up treasures of the past as a means of enriching the mind, and the idea of excluding history from the list of school subjects is nowhere, I take it, now seriously entertained.

Current ideas as to the function of historical teaching.

While much of the difficulty some have felt in allowing to history any educational value no doubt arises from the prevalent mechanical and irrational methods of teaching it—a subject on which it is unhappily possible to say a great deal—it is also due to a narrow conception of what history should do for those who study it. If one were asked what part history

[1] *Education*, by Herbert Spencer (London, 1893), pp. 29—30.
[2] *Essais*, i. 25.
[3] *Thoughts on Education*, § 184.
[4] Compayré's *History of Pedagogy* (tr. Payne), 80.
[5] *Ibid.* 116. [6] *Ibid.* 298.

should play in that equipment of the child for the business of living which is the great purpose of education, the obvious, unconsidered reply would be that it should train him to discharge the duties of a citizen. This was a great point of Dr Arnold's[1]: he held it to be of capital importance that, with the wide extension of civic responsibilities involved in the Reform Act of 1832, there should be a new era of historical instruction to fit the citizens of the coming generation for their task. The point of view is an attractive one, and one which should certainly be kept in mind; but at the same time it is clear that, if history is to be taught only that the future elector may know how to vote, we expose ourselves, in teaching history as we do, to Herbert Spencer's artillery; and to his contention that the facts we offer our pupil are useless for the purpose in hand and should be replaced by the outlines of civic or political philosophy, there is really no reply. A less superficial and yet far from complete account of the purpose of history as a subject of study is that it should train the judgment. 'I regard,' says Bishop Stubbs in his essay on 'Methods of Historical Study,' 'the judicial faculty, "judgment," as in vulgar unphilosophical language we call it, as that on which historical study produces the most valuable results[2].' But, though to my mind this is a much wider and nobler view of the office of history than the other, it nevertheless puts us in this difficulty, that it is somewhat early to train the judicial faculty, in the sense here intended, at the age of twelve or fourteen, and the view of Bain, that history is after all a proper subject of study only for the university student, begins to appear very reasonable. Unless we can find a larger and more practical sphere for the subject, it must inevitably, in an age which is putting all educational conventions to the

[1] Quick, *Educational Reformers* (1894), p. 447.
[2] *Lectures on Medieval and Modern History*, p. 94.

severest of tests, yield its place to competitors which can give a better account of themselves.

Scope of the essay.

If I here attempt to mark out for history a somewhat wider domain, I trust it will be recognized that I do so as a student of history, conscious of his obligations to the study and anxious lest it should miss its due recognition, rather than as one who has carefully considered the question in its relation to other parts of the pedagogic art. As a subject which, in my view, can be profitably studied in the elementary, the secondary and the academic stages of education, history will clearly have a different value, that is to say, the valuable elements in it will be differently proportioned, according to the age and level of progress of the pupil. This part of the subject, however, I pass by, leaving it to professed students of education to say what bearing it has upon the organization of historical teaching, and only expressing this opinion, that no *university* teaching of history is adequate which does not, in the first place, deal largely in general principles, the main currents of life and thought on which the events of history are but the flecks and ripples, and does not, in the second place, bring the student into contact with the sources of our historical knowledge, and show him how history books are made.

History gives a knowledge of the world.

It appears to me, then, that one of the most valuable functions which history can perform is to give us, in the best sense of the phrase, a knowledge of the world. What physical science does for the world of nature as opposed to man, history does for the world of human nature. Mathematics, physics, chemistry, biology, teach us our way about among the immutable laws of the universe: history shows us what we may expect to find among men and human institutions. Several writers have impressively set forth the way in which history may free the student who enters into its spirit from the limitations of the untutored mind.

'The study of history,' says Quick[1], 'like travelling, widens the student's mental vision, frees him from the bondage of the present, prevents his mistaking conventionalities for laws of nature.' The man with no knowledge of history, remarks Fouillée[2], 'will lack the sense of human and national solidarity, will lack the sense of time, and will be the dupe of every abstract utopia.' One more quotation, from the writings of Bishop Stubbs[3], may perhaps be pardoned: 'We learn (i.e. from history) patience, tolerance, respect for conflicting views, equitable consideration for conscientious opposition; we see how very differently the men of the particular time seem to have read the course of events, which seem to us to have only one reasonable bearing; we see how good and evil mingle in the best of men and in the best of causes; we learn to see with patience the men whom we like best often in the wrong, and the repulsive men often in the right; we learn to bear with patience the knowledge that the cause which we love best has suffered, from the awkwardness of its defenders, so great disparagement as in strict equity to justify the men who were assaulting it.'

It is no reply to such an estimate of the worth of history that the facts with which it has mainly to do are great political and social facts, of large significance, such as few men and women are required to deal with in the experience of a commonplace life. For the careful student of history is well aware that human nature, which is the living force at the root of all historical events, is the same force everywhere, whatever the scale of the theatre upon which it displays its energies. The lives of statesmen, warriors, and kings are but large type editions of our own. He who has rightly learnt the lessons of the reigns of Edward II. and of Charles I. will have learnt

[1] *Educational Reformers* (1894), p. 449.

[2] *Education from a National Standpoint*, by A. Fouillée, tr. Greenstreet (London, 1892), p. 218.

[3] *Lectures*, p. 95.

how the private citizen may ruin his affairs by self-indulgence or by lack of candour.

Ethical side of historical study.

The last remark may serve to remind us that history has, in addition to the intellectual breadth of view it encourages, a very important moral value. It is the business of the historian to show us men in action, acting for moral or immoral ends, and the story of their deeds will be a far better vehicle of moral instruction than any set of ethical rules. Unfortunately, history has not always been written in that judicial temper which alone gives value to any moral lessons one may draw from the past: the study of the partisan author will give the pupil no real grasp of the great ethical truths of life, but will only teach him the lesson, which comes to most of us without a tutor, of partisanship. Within the last few years there has been, no doubt, a great change in this respect: a historian's first duty, it is now recognized, is to be impartial. But there is some danger nowadays lest, steering clear of the Scylla of prejudice, we fall into the Charybdis of indifferentism. Some writers are so jealous of the historian's reputation for impartiality that they decline to pass moral judgments at all, as though the historian, whose duty it is to record human actions, could afford to ignore that which is most human about them. One feels instinctively that, whatever the practical difficulties of the application of ethical tests, there is the genuine ring of truth about Lord Acton's dictum, 'that it is the office of historical science to maintain morality as the sole impartial criticism of men and things, and the only one on which honest minds can be made to agree[1]."

History and patriotism.

I have already remarked that one view of the function of history is that it should train men for citizenship. Undoubtedly we have here a very important truth, provided it is understood that a training

[1] *English Historical Review*, iii. 578.

for citizenship involves something far more than that cultivation of the mind which is necessary to the giving of an intelligent vote. Those who talk as if all that was needed to make a good citizen was that he should understand the consequences of his electoral acts ignore the stimulus which is necessary to make a disinterested and public spirited, as well as an intelligent voter. That stimulus, of course, is love of country. The cultivation of an enlightened, yet earnest, patriotism is one great service, perhaps the greatest, which history can render to the state. It is worth noting that in two countries at least, namely Germany and the United States, this power of history, when rightly taught, to create a genuine love of country in the rising generation, has been fully comprehended, and historical teaching has assumed corresponding importance. Not only in the High Schools of America, answering in the main to our secondary schools, is the history of the United States a subject of instruction, but it is a part of the curriculum of every grammar (or elementary) school. Some study of history is required from every pupil of the Massachusetts Institute of Technology, though the rest of the teaching is almost entirely scientific and technical[1]. The account which I shall shortly give of the teaching in a school in Rhenish Prussia will show how in Germany, too, the value of this study as the nurse of patriotism is fully recognized.

Nor will it be denied that history can and should do much to foster local as well as imperial patriotism, the love of one's native city or province as well as an honourable pride in the great state which encircles all. In the United States children are encouraged to write the history of their own town, and the more advanced pupils are assisted in preparing monographs, the material for which is drawn from individual reading, upon

[1] Miss Burstall's *Education of Girls in the United States* (London, 1894), p. 89.

local institutions[1]. In a country like Wales, again, where national feeling is strong without being anti-imperial, the study of the national history gives the readiest access to the scholar's enthusiasm and imagination, and, on the familiar principle of 'working from the known to the unknown,' it should be a preliminary to that study of the history of the Empire which is needed to make us realise our responsibilities as heirs of a vast inheritance.

Prevalent methods of teaching. (i) The epitome;

Fragmentary though this account of the functions of history as a subject of study may be[2], it will suffice, I trust, to show that it is a subject important enough to demand a large place in our educational system, and I turn accordingly to the question of method. Here one has at once to confess that, however exalted the mission of history may ideally be, its practical utility has been in the past reduced, by false methods of teaching, to a very low point indeed. Of the considerations I have advanced above in favour of the teaching of history, there is hardly one that holds good for history as commonly taught. Neither knowledge of the world, nor moral insight, nor yet patriotism, national or local, is likely to be imbibed from the careful learning by heart of the battles of the Wars of the Roses or the names of the English kings from Egbert to the Conqueror. The methods chiefly in vogue may be briefly characterised as the epitome method, the reading-book method, and the recitation method. I take the epitome method first, as the most widely prevalent, at any rate in secondary schools,

[1] Miss Burstall's *Education of Girls in the United States*, pp. 94–5.

[2] A friend has kindly pointed out to me that I have omitted to notice the very important part which the study of history may play, in early years, in the training of the imagination. I recognize the omission, and will only say, in explanation, that in writing I have thought almost entirely of the secondary school, and hardly at all of the elementary school, or of the University.

and undoubtedly the worst. It consists in placing in the hands of the pupil one of those cunningly devised summaries of all English history, thickly seasoned with dates and tables, in which an amazing amount of information is compressed within the narrowest limits, and then expecting the hapless youth or maiden to commit assigned portions to memory. I well remember the surprise which a pupil of mine, newly arrived at college from a school where this was the plan, expressed on getting, in a history examination paper, questions which involved a certain amount of thinking: 'I thought,' was the naive remark, 'we should have been asked to *write out a reign*.' Indeed, I have a lively recollection of the compendium to which I devoted many hours of my own schooldays, the most compendious and systematic of its kind, a history with all the life crushed out of it. Such books resemble nothing so much as the pemmican of American hunters—they are an exceedingly compact, but at the same time a highly unpalatable form of intellectual sustenance. No one who has followed me in the account I have tried to give of the function of history will need to be told that the epitome system is radically vicious. There is a well known maxim in education—'the concise is the opposite of the elementary,' and in no field of study is this truer than in history. The compiler who rigidly strips his narrative of all ornamental and illustrative detail may suppose he is giving the pupil the very pith and marrow of history: he is, in fact, robbing the story not only of all its interest, but of all its value. For history is only worth studying in so far as it vivifies the past, lights up the dim spaces of the bygone world and fills them with figures which move and feel and live. That Henry VIII. was six times wedded is of small importance to us, even though we know the names and the parentage of the ladies: what is vital is that we should have a clear conception what manner of man he was.

I have, of course, no quarrel with the epitome as a

convenient book of reference for the student. It is in its own sphere as useful as the table of contents usually prefixed to any substantial volume, but, as Quick[1] remarks, to treat the epitome as a thing to be got up by rote is as though one were to learn such a table of contents by heart. I cannot say that I attach much importance myself to the storing of the memory even with dates and genealogical tables. No doubt it is convenient to the historian to have such matters at his fingers' ends, but the power of getting them up by heart is something very different from an aptitude for history, and the energies devoted to the task might in most cases, I think, be more profitably employed in other directions. A few leading dates, which serve to articulate the field of study, may be learnt with advantage, but even here I am inclined to believe that more may be done by means of chronological charts, in which each century occupies an equal space, than by simple tables of dates.

(ii) The reading-book;

The reading-book method is not in itself so inept, but there is reason to fear that in practice it often turns out to be little better. The historical reader is the basis of this method: the book is read aloud in turn by the members of the class, who are then, with or without an interval for mental digestion, questioned upon the day's reading. Of the Readers themselves there is no occasion nowadays to complain: the reading-books of twenty years ago were no doubt somewhat stolid productions, written for the most part by men without historical enthusiasm or insight, but since Green's 'Short History' has become a school text-book, and historians of the eminence of Dr Gardiner have been pressed into this service, there has been no want of colour and life in the presentation to the scholar of the history of his native land. Nor can it be said, if the scholar is not asked to get up the text-book by heart, but only to answer intelligently questions based upon the reading of the day, that the method

[1] *Educational Reformers*, p. 485.

is an unsound one. But it appears to me to be incomplete, and, for this reason, liable to become most perfunctory. It makes no proper provision for revision of, or reference to, past lessons, it gives the pupil no adequate opportunity of cultivating his own power of historical statement, and, worst fault of all, it demands nothing from the teacher, but leaves the pupil with what he has been able to extract unaided from the text-book and nothing more.

(iii) The recitation.

The recitation method is an improvement upon that just described in one respect, and in one respect only. It certainly does cultivate in the pupil the power of expression. The method is the one chiefly followed in America, and consists in directing the scholar to read a certain amount of historical matter, and then to restate the whole in words of his own to the teacher. It is easy to see that such a method, in the hands of a skilful teacher, might produce excellent results, but in practice it appears to be carried out almost as mechanically as the two already dealt with. The great aim of American teachers, we are told, is to teach their pupils to read for themselves, and this, laudable enough as *one* object of a system of instruction, leads to a great neglect of the active part of a teacher's work, the exercise of influence over young minds. Few teachers of history attempt to kindle the interest of their pupils: no ethical lessons are drawn: difficulties are not explained, and all new work is done first by the pupil himself[1]. While the system is truly American in encouraging self-reliance and independence of thought, it nevertheless attenuates and impoverishes historical teaching and substitutes for the despotism of the teacher that of the text-book.

It is no easy task to follow up this criticism of the methods in use with some indication of a more excellent way. There

[1] Miss Burstall's *Education of Girls in the United States*, pp. 93–4.

is, after all, no ideal method: the teacher must have an eye to the subject in hand, the previous knowledge and the home life of his pupils, and his own power of treatment. Still, some points have been made sufficiently clear. First and foremost, it is safe to assert that no system of teaching history can be good which does not excite the interest of the pupil. 'Why do children dislike history?' asks one writer on the subject[1]: if it be the case that they do dislike it, it is certain they can learn nothing from it. Lessons of prudence, of self-restraint, of patriotic devotion, can never be conveyed by the mere force of dinning them into the ears of unsympathetic listeners: they must be received in a friendly and open spirit. Interest may be kindled in many ways, but let it be clearly understood from the start that the responsibility for maintaining it depends upon the teacher. He must himself be interested, or he can communicate nothing to his scholars. It is the business of the teacher, by his vigorous and individual treatment of the subject, to conquer that fatal tendency to routine which is the ruin of history teaching. For this reason I hold that he should open up each topic himself, should introduce the pupil to it, pointing out, first its salient features, and afterwards its difficulties: the scholar should not be left to plough what is for him virgin soil without assistance. The inclination to mechanical work may be with advantage corrected by teaching through the eye as well as the ear: the blackboard should be brought into constant requisition for illustrative diagrams: the geography incident to the history lesson should be elucidated with the aid of wall maps, both flat and moulded to represent physical features: photographs, prints, coins, and archæological relics from the school museum should all be brought into use.

Interest essential.

But, while much is required of the teacher, it is equally

[1] *Methods of Teaching History*, Boston, U.S.A., 1889.

necessary that the pupil should not be merely receptive. The history lesson should not be, what I have known the science lesson to be in some cases, an entertainment kindly provided by the teacher, which relieved the tedium of severer studies, and only asked from the pupil that he should act as spectator. There should be much questioning, the power of making valid comparisons should be developed, and the scholar should be taught to give clear and accurate expression to his opinions.

The teacher's work.

Having said thus much in general terms, I think I cannot do better than set before my readers, as a concrete instance of the way in which these ideas may be worked out, an account of the methods pursued in a school in Rhenish Prussia which was visited by Dr Klemm[1]. The history lesson was usually the life of some great historical character, and was opened by a narrative from the teacher, who told the story chosen for the day in simple yet earnest language, using the map and blackboard from time to time, and quoting from the national poets fragments appropriate to his topic. Throughout the narrative there was breathless attention. The next step was to ask the children themselves to repeat the story; and this gave an opportunity for questions bearing upon the causes and effects of the narrated incidents and upon their moral significance. Next, the children were asked to give, from their recollection of previous lessons, cases analogous to those which were that day being discussed, and Dr Klemm was surprised at the ready and appropriate answers given at this point. Last of all, the story was set as an exercise in composition, training being thus imparted in the giving of written, as well as oral expression to thought, while the whole lesson was finally imprinted upon the mind.

An illustration from Germany.

[1] *European Schools*, by L. R. Klemm (New York, 1893), pp. 24–5.

Training of the teacher.

All this means careful preparation on the part of the teacher, and we realise that there is one powerful argument for the present system—it is the easiest. It requires no intellectual effort to check the learning by heart of a text-book, or to ask commonplace questions out of a chapter in a Reader. Some Readers, indeed, are obliging enough to provide the questions at the end of each chapter. In a word, inertia tells for the existing methods: an effort is needed to improve upon them. There is, therefore, this difficulty in the way of reform—that some teachers are without energy, and, more important still, a vast number are overworked. History cannot be well taught when it is but one of a number of subjects which must be crowded into the teacher's day: the rough and ready method becomes the only possible one. Without pronouncing an opinion upon the general question of teachers for subjects as against teachers for classes, I venture to assert that we shall never get satisfactory historical teaching in our schools until the task is undertaken by men of special aptitude for it. As long as it is supposed that anyone can teach history, just as in olden time in Wales it was thought that any disabled soldier or artisan was fit to keep school, so long shall we be without any true teaching of the subject at all. Thus my last word has reference to the necessity of training teachers of history. A thorough training in the subject to be taught is recognized as essential to the teacher of classics, of mathematics, and of science: it does not need further demonstration, I trust, that a like training is indispensable in the case of history. What the teacher does not see himself, he cannot make others see: if he has no historical knowledge, no grasp of historical principles, no sense of historical perspective, he cannot use these as instruments of education. He becomes the preacher of an evangel he does not understand. I attach the greatest value, therefore, to history as a necessary feature of every general

scheme of University studies, and I believe, moreover, that every one who looks forward to teaching history in a secondary school should strive to equip himself for that duty by studying history, for a part of his course at least, under the guidance of a University teacher. The older Universities offer ample encouragement to the honours student who desires to specialise in history, and the University of London, which, until very recently, treated history with strange disparagement as merely the humble handmaiden of literature, has now given it a place in the arts degree course which is more worthy of its position in the circle of European studies.

Not only teachers, but the great public which employs and controls them, must have the truth impressed upon them that history has ceased to be the agreeable pastime of men's leisure hours, and has become a science, a science which it is as necessary to teach, to train men to teach, to pay for, as chemistry or botany. It is the science of the past, with a fuller and deeper message for man than even the physical sciences which have in our day done so much to increase his material well-being and to widen his mental horizon.

CHAPTER VI.

GEOGRAPHY.

No subject is more universally recognised as a necessary branch of education, but few are more generally neglected. Geography, as the science of the surface of the earth, and of the things and phenomena in causal connection therewith, offers a wide field for study, but the very vastness of the subject makes the adequate handling of it difficult. Hence, though acknowledged to be a weapon indispensable to a well-equipped educational armoury, it is too often left to rust on the shelves, or placed in inexperienced hands.

Touching geology on the one hand and history on the other, it forms the connecting link between the natural sciences and the humanities. Dealing with what is the scene of our existence as well as the theatre of history, it has no less interest for the student of the present than for the student of the past. For the statesman there are the questions which relate to the political partition of the earth, for the soldier those dealing with the relief of its surface; the merchant must know the distribution of its resources, the doctor its climatic conditions. To the historian geography offers the key to many problems. The migrations of races, the sites of settlements, the boundaries of nations, are largely governed by geographical factors. In Europe, of the races that came from the East, the more civilised advanced by sea along the Mediterranean, the less civilised, travelling by

Scope.

Value.

land, passed along the northern plains. The rocky bays and islands of Norway, as those of Dalmatia, could not fail to breed hardy sailors of a piratical turn. The mountain-masses of Montenegro and Switzerland were predestined by Nature to be the homes of independent peoples. The Pyrenees and Alps inevitably split the Latin races into three.

In the Middle Ages, when the Mediterranean was the centre of civilisation and of commerce, the position of Italy gave predominance to Venice and Genoa. Portugal, by its position, was the natural pioneer of exploration in the Ocean beyond the Straits of Gibraltar, and found at first its only rival in its neighbour Spain. As long as the Atlantic formed an impassable barrier towards the West, the expansion of England was impossible. When once the ocean had been crossed, our position as an outpost of Europe gave us a positive advantage in the race for Empire.

General interest in the geography of some region is frequently aroused by the outbreak of war, a frontier dispute, or the exploits of some intrepid explorer. For a short time every one is a student; books are read, maps consulted, and no detail seems too small. But the fit soon passes by, and all is forgotten. The shoot has withered up and died for want of a well-rooted trunk to graft it on. That this is so in the majority of cases must be accounted for by the failure to teach geography properly in schools.

Ill-taught.

The committal to memory of a long catalogue of names may be an exercise in mnemonics, but for teaching geography it is as useful as the learning of the index would be in studying a book.

It is not very long since a text-book advertised as meritorious the fact that it contained 20,000 names! Nothing could more completely condemn it. A dictionary may show that a language contains thousands of words, but only a few hundreds are needed in ordinary circumstances. To become

proficient in the use of the language, it is more important to be closely familiar with these selected words than to be even distantly acquainted with the rest of the dictionary. Similarly, in teaching Geography, the main point to strive for is the elimination of the unnecessary and emphasising of the important features. In any one European country there are not, as a rule, more than 20 towns that a boy need know; but he should possess an accurate acquaintance with their relative size and position, their requirements and products, their historical associations and present importance. The aims of geographical teaching will, however, perhaps best be shown by a description of methods.

Aim.

There are two methods that can be adopted in beginning the teaching of Geography. The *general*, which considers the world as a whole, the *particular*, which takes the parish or local district as a starting-point. The weight of opinion undoubtedly favours the latter course. As the function of education is to stimulate and not to stupefy, to prove awakening rather than wearisome, it is better to begin with the known than with the unknown, to take what is at hand and familiar rather than what is far off and hard to comprehend.

Methods.

Hence, in Germany and other continental countries, the first stage, both in primary schools and in the preparatory classes of higher schools, is *Heimatskunde.*

Heimatskunde.

The first aim should be the instilling of clear ideas as to *position.* Such terms as left and right, in front and behind, are relative to one's temporary point of view, and can be reversed by simply turning round; it is important therefore at the outset to determine the cardinal points of the compass. This should be done not by a compass, whose usefulness and variations can be better explained at a later stage, but by the daily

First principles: (*a*) Position.

movement of the sun, a method which permits of an early lesson in training the important faculty of observation. Sunrise and sunset give, approximately, east and west; the south should be found by experiment. As the sun is at its highest point when due south, the shadow which it casts will then be shortest. To find when this is the case, set a stick upright in some accessible level ground. At nine or ten or some convenient hour before noon, mark on the ground the end of the shadow. Then, with the help of a piece of string of the same length as this shadow, draw a circle with the stick as centre. In the afternoon, observe where the shadow, which will have been getting shorter towards noon and then longer again, once more reaches the circumference of the circle. Mark this point, and draw a straight line joining it to the first mark. Take the middle point of the line, and join it by a straight line to the stick. This line will give the direction of the shadow when shortest, and thus indicate the position of north and south, while the other line will give east and west.

In the case of some schools such an experiment may be difficult and even impossible, but in the majority of cases, with a little thought and management, all difficulties might be overcome, while the value of such an object lesson can hardly be over-estimated. In many schools abroad, the chief points of the compass are marked on the floor of the class-room, or on the ground in the school-yard, and the pupils exercised in marching in different directions, with excellent results. The value of the Pole star in determining the direction of the north at night should not be overlooked, but a direct observation is not generally possible during the usual school hours. At a later stage a simple and useful, but little known, method of readily determining one's position as regards the points of the compass might with advantage be taught to older pupils. If at any time of day a watch be held so that the hour-hand points

towards the sun, then that point on the dial which is midway between the hour-hand and the figure 12, reckoning, before noon, in the direction in which the hands move, and in the reverse direction after noon, will indicate the south. For instance, on a watch held in this way, at 10.0 A.M. the figure 11, and at 4.0 P.M. the figure 2, will give the required direction.

(*b*) Distance.

After imparting clear ideas as to position, the next aim should be the development of equally clear ideas as to *distance*. The distance from wall to wall in a room can be used to give an idea of the meaning of feet, the length of a street for yards, and the road to some well-known point in the neigbourhood for miles.

(*c*) Area.

Following close upon distance comes naturally *area*, and again the class-room, the playing-field, the town can be impressed into service to give clear ideas, from familiar places, of the comparative sizes of different areas.

A plan of the school might with advantage be made; a map of the town in which it stands should certainly be obtained, and pupils taught to trace on it the routes to different points, until familiar with the bird's-eye view which a map presents, care being taken to keep the north always at the top in order to accustom the eye to the arrangement now almost universally adopted.

Insistance on such apparently elementary matters as relative position, distance, and area, might seem unnecessary, but experience soon shows the hopeless confusion that follows from lack of clearness on these points. In those countries where the teaching of Geography has been carefully studied and systematised in a way that we have not yet learnt to adopt, the Heimatskunde stage is often prolonged, in primary schools at least, for a period measured by years rather than months.

From the Geography of the parish or local district the teacher may at once proceed to the world as a whole. To attempt to work steadily outwards, from the parish to the neighbourhood, from the neighbourhood to the county, from the county to the country, adding knowledge by a series of concentric accretions gathered round the original unit of the parish, is to adopt an unsound method productive of difficulties similar to those which would arise if, in the teaching of the history of political institutions, after rightly making use of existing forms to explain the meaning of ordinary terms, we should proceed to work steadily backwards, to find the way blocked by incidents only explicable, like the French Revolution, through a knowledge of the events that preceded them. The reason for beginning with one's immediate neighbourhood is to make use of what is at hand and familiar. When once this is left, it matters not whether the next step is to regions ten miles or ten thousand miles away, both being equally unknown.

Second stage.

In the second stage, then, comes the consideration of the world as a whole. For this purpose a Globe should be used, as being both more convenient and more readily understood than a map. Its shape at once impresses the form of the Earth upon the mind; with its aid we can demonstrate the movements which give us day and night and the ever changing seasons, while its surface shows the main features of the distribution of land and water. With a globe and a lantern the varying lengths of day and night, the phenomenon of the midnight sun, the long summer day and long winter night at the poles, and similar matters otherwise difficult of explanation, can at once be made clear. By it, too, the method of dividing up the surface of the earth by lines of latitude and longitude, the meaning of the Equator, the Tropics, the Arctic and Antarctic circles, can more readily be explained than by any map, one of its most important functions being indeed to serve as

Use of the Globe.

an introduction to cartography. Many of the principal phenomena of physical geography, such as the movements of the air and the currents of the sea, are also simplified by the use of a globe.

A globe, indeed, is indispensable, and should be introduced immediately after the first stage already described, thus taking precedence of all maps save the plan of the parish or town.

Importance of Physical Geography.

The basis of all geographical teaching should be physical; familiarity with the meaning of the ordinary terms employed, as well as with the commoner phenomena to be met with, should therefore be striven after at an early stage.

Illustration of terms by local examples,

There are few neighbourhoods which do not offer illustrations of some of the simpler terms in use, such as hills and valleys, and rivers with their right and left banks; but the favours of nature are unequally distributed. A boy living by the sea will understand such terms as capes, bays and tides as readily as a Swiss child will understand glaciers, moraines and the snow line; but to the former a moraine is likely to prove as great a stumbling-block as a tide to the latter.

or by Models.

All terms which cannot be illustrated from nature should be made clear by pictures or models. Clay and sand are readily obtainable, and are easily moulded to show what is meant by a ravine or a cañon, a river-basin or a watershed; and the small amount of trouble involved is amply repaid by the clearness of conception to be gained from a model even when rudely made. The answers in examination papers but too painfully show that much teaching is confined to the dictation of definitions. A definition in clear words is an excellent thing, and necessary for young minds incapable of precise expression; but no definition should be given until the meaning of the term defined has been made

familiar to the eye as well as to the ear. For example it is well to define the Equator as "an imaginary line, which &c.," but, if the definition has been preceded by a clear demonstration on a globe, such an answer as "the Equator is a menagerie lion running round the hottest parts of the earth" becomes impossible. Especially important is this in the case of terms like "watershed," where the name, by its resemblance to other words, invites confusion. More than once have I met with such explanations as "watershed is a covering over the top of the river" or "something like the roof of a house." A simple model in clay, on which water could be poured, would prevent any such confusion as is implied in these answers.

With a little thought, the resources of many districts for furnishing illustrative examples can be increased beyond their apparent capacity. For example, the well-known demonstration of the rotundity of the earth, supplied by the gradual sinking of a ship below the horizon as it sails away over the sea, can be replaced in an inland district by an observation of the steadily increasing distance of the horizon as one ascends a hill or tower. In this respect it is useful to remember a simple formula:—the square root of $1\frac{1}{2}$ times the height in *feet* is equal to the distance of the horizon in *miles*. For instance, at a height of 6 feet we should be able to see to a distance of 3 miles, at a height of 24 feet to a distance of 6 miles, while at the top of Ben Nevis, 4400 feet high, the horizon will be a little more than 80 miles away. Again, many of the phenomena connected with running water, the winding of streams, the erosion of valleys, even the formation of deltas, can often be seen by the roadside after a heavy shower.

As climate is one of the most important factors which influence life, it is necessary that the conditions which affect it should be known. In the first place, the heat of the sun varies with the

The Atmosphere. Its temperature.

inclination of its rays. This can be simply shown by means of a strip of paper with parallel edges, representing a portion of the sun's rays, and a straight line drawn on a board, indicating a part of the earth's surface. By moving the paper, it is readily seen that when the strip meets the line vertically it covers a smaller portion of it than when it is inclined at a lesser angle; that is, when the sun is low in the sky, the same amount of rays will spread over a larger surface of the earth than when it is overhead; consequently, the warmth given by the sun's rays is less, the lower it stands in the sky. The altitude of the sun varies with the latitude; as a general rule, therefore, the higher the latitude, the colder is the climate. There are, however, modifying agents, the chief of which is the Atmosphere. Among the principal features to be considered with regard to the Atmosphere are its movements, which constitute what we call winds.

Winds are of three classes, Permanent, Periodic, and Occasional. The first class includes the steady Trade-winds, which owe their name to their customary regularity, and the more violent but less regular Anti-trades; the second, such seasonal winds as the Monsoons; the third, irregular varieties like Hurricanes. The first of these classes is the most important, involving as it does the main features of the circulation of the air. Though a full explanation presents many difficulties, a fair understanding can be arrived at by simple means. There are two belts of high pressure about 30° north and south of the Equator, while the equatorial and polar regions are areas of low pressure. The probable reasons for these facts can be explained at a more advanced stage. Air tends to flow from regions of high to regions of low pressure, just as water tends to flow from higher to lower levels. Hence air flows from these belts of high pressure towards the Equator and the Poles. Were the earth stationary, the result would be winds blowing due north

Its movements.

and south; but the earth rotates on its axis with a velocity which increases from nothing at the poles to more than a thousand miles an hour at the Equator. The currents of air, then, which move towards the Equator, approach regions that are moving faster than those they came from; they get, as it were, left behind, and acquire a direction opposite to that in which the earth rotates. The earth spins from west to east; they therefore tend to move from east to west as they approach the Equator. Hence the Trade-winds are not N. and S., but N.E. and S.E. winds. This deflection can readily be shown by letting a drop of water run down a rotating globe, or by drawing a line from the centre to the circumference of a rotating disc of cardboard.

On the other hand, those currents of air which move towards the Poles pass from fast-moving regions to slower ones; hence they get, as it were, thrown forward, giving them a tendency from west to east. The Anti-trades accordingly become S.W. and N.W. winds. An illustration, which should appeal to most boys, would be that of a lad throwing a ball at an object running past him; and, on the other hand, when himself running, throwing at something stationary, which he is rapidly passing. In each case the object, if aimed at straight, will be missed, the ball in the one case passing behind, in the other in front of, the target of his aim.

From the movements to the moisture of the Atmosphere is the next step. The Sun draws up moisture into the air as a fire does from damp clothes. Winds passing over the sea take up moisture as they do from things hung out to dry on a windy day. The examples are familiar, but apt. Hence in tropical parts there is usually much moisture in the Atmosphere, while winds passing over the ocean become more heavily charged with aqueous vapour than those which cross land. Cold condenses this vapour in the air and precipitates it as rain, just as the

Its moisture.

moisture in a room is condensed on the cold surface of a glass. Consequently a mountain range tends to drain a wind of the moisture which it bears. With a knowledge of a few facts such as have been dwelt upon, the climate of many parts of the world can at once be guessed.

In South America, for example, in the tropical parts the winds come from the east heavily charged with moisture. The great barrier of the Andes drains these winds. Result, on the one side, the mighty Amazon with its dense forests; on the other, the rainless region of Peru. Further south, in the region of the Anti-trades, the winds come from the west; consequently Chile is fertile, while much of Patagonia remains a desert.

Ocean currents.

With a knowledge of the permanent winds, an explanation can be given of the chief surface currents of the sea, which, in many cases, such as the warm Gulf Stream or cold Labrador current, by reacting on the atmosphere, have an important influence in modifying climate.

The great circulation of the water of the Ocean, which leads to the presence of ice-cold water at the bottom of the sea even in the Tropics, can be illustrated by an experiment that only requires two glass dishes, one slightly larger than the other, a lump of ice, some hot water, and a little aniline dye or other colouring matter. Place one dish in the other, fill the smaller with water, and suspend the ice in its centre. Then, if hot water be poured into the space between the two dishes, the conditions of polar cold and equatorial warmth will be obtained. Currents of cold water will sink from round the ice to the bottom, and radiate in all directions to the sides, while warm currents set in along the surface towards the centre. A little of the dye dropped in round the ice will make them visible.

Such an experiment is, however, more suited for advanced

pupils; at the outset, only the essentials of physical geography should be emphasised. For instance, vegetation, in contrast with sand, has the interesting property of inducing the precipitation of moisture; but it is unnecessary to dwell upon this in contrasting the tropical forests of the Amazon with the Desert of Sahara. In fact, to do so, without emphasising the difference between the rain-laden winds of the former region and those which prevail in the latter, is to play Hamlet without the Prince of Denmark.

Having mastered the main essentials of physical geography, the way is clear to that detailed study of the surface of the globe as partitioned out among the nations of the earth, which, under the name of *political geography*, forms the chief branch of geography as usually taught. Beginning but too commonly with a catalogue of capes, and ending with one of counties and chief towns, nothing could well be more dreary and unprofitable. As an exercise for the memory such teaching may have a small value; for an intelligent appreciation of the earth's surface it has none whatever.

The detailed study of the earth's surface.

In choosing a starting-point from which to begin the detailed study of the surface of the globe, we naturally turn to our own country, for the same reason of familiarity that led, in the earliest stage, to the selection of the local parish.

Starting point.

It will be desirable to have at the outset three good wall-maps: (1) The British Isles, (2) Europe, (3) The World. With these can be graphically shown the first two points to be dealt with—*relative position* and *relative size*. With regard to the latter point it will be well to be particularly clear, and the area of the British Islands might with advantage be committed to memory as a standard unit of comparison for use when studying other countries. The true importance

Order of consideration: 1. Position and size.

of the position of the British Isles as an outpost of Europe towards the New World and the centre of the land hemisphere, as also the protective value of our insularity, will probably be realised only at a much later stage, but the facts should be dwelt upon.

After position and size, come naturally *outline and relief.* These should be dealt with first on broad lines. The names of a number of capes and bays have no value until the general sweep of our much-indented coast, which allows the sea to approach within a hundred miles of any part of the interior, is known. The heights of a few isolated peaks are meaningless until the position and general elevation of the mountain chains or masses to which they belong have been considered. The conditions of a coast line largely determine the position of a country's ports; the relief of its surface influences the direction and character of its streams and of its lines of communication.

2. Outline and relief.

From relief the next step is to *climate.* Compare our mild insular climate with the severer extremities of the continent. Contrast it with the rigours of Labrador, and of places in the same latitudes in the southern hemisphere. Note how the S.W. Anti-trades, coming across the ocean, arrive rain-laden at our western shores, to be largely robbed of their moisture by the mountains of Cornwall, Wales, Cumberland, and the Pennine range, leaving the East of England much drier than the West.

3. Climate.

Rainfall leads appropriately to *rivers*, and with the rivers—the natural arteries of a country—the more detailed study of a body, whose skeleton, as it were, has already been considered, may best be begun.

4. River system.

In the confusion of most maps, the course of a river can often only with difficulty be discerned. It should be dissected out from its surroundings, as an anatomist separates a nerve or blood-vessel whose path he wishes to trace.

For this purpose let the black-board be used. Draw an outline map of the country under consideration, and insert the chief rivers one by one, tracing them from source to mouth, with explanations of their courses, and some details of the districts they pass through, and of the towns upon their banks.

An example will best illustrate the method. Let us take for instance the Severn.

The Severn rises in Wales. Starting from the slopes of Plinlimmon, it flows in a N.E. direction, following the general trend of the ranges of mountains in Wales, which run from S.W. to N.E. At the English border it is joined by the Vyrnwy. It then enters, with an easterly course, the county of Shropshire in England. On a fine natural site for defensive purposes—a piece of rising ground in the middle of a great horse-shoe shaped bend of the river—the town of Shrewsbury has grown up. With a southerly trend the Severn passes out of Shropshire and through Worcestershire. Where the Stour joins it, lies Stourport; in the middle of its course through the county, the city of Worcester; and, on the borders of Gloucestershire, Tewkesbury, where it is joined by the Warwickshire Avon, on whose bank stands Warwick. In Gloucestershire the Cotswold Hills turn its direction towards the S.W., and after again passing the capital of a county, Gloucester, it enters the great estuary which bears its name, and which conditioned the growth of Bristol, the south-western port of England, just as the great estuary of the Thames conditioned the growth of London on the east. Each of these points should be mentioned, a slight pause being made for emphasis as the chalk reaches the appropriate position in the course traced upon the board.

In a similar way the Thames and the other chief rivers should in turn be inserted, and, by the time the map is finished, the position of most of the principal towns as well as the courses of the chief rivers will have been learnt.

With regard to marking the position of towns, it is advisable to adopt some definite method to indicate their relative sizes as approximately determined by the number of their inhabitants. It is absurd to indicate by a dot London which covers an area almost as large as the county of Rutland, or to use the same pin-point for Manchester and Milford. Leaving aside London, which stands in a class by itself, a convenient method will be to draw a circle to mark towns with 100,000 inhabitants, adding a larger concentric circle for each additional 100,000; to take a square for those which have from 50,000 to 100,000; and to reserve a dot for the smaller places. In this way the great industrial centres like Manchester and Liverpool, Birmingham, Leeds and Sheffield, will receive that prominence which their size and importance warrant, while the map will roughly indicate at a glance the general distribution of the population of the land.

5. Centres of population.

When this stage has been reached, the position of many of the chief centres of population will already have been learnt. The more detailed study of the other centres may well be preceded by a general survey of the natural resources of the country, and especially of its mineral wealth. One of the most striking features to be noticed is the shifting northwards of the centre of gravity of the population of England, a consequence of the development of the great coal-fields for industrial purposes. After the last census, a striking map was published in Petermann's *Mittheilungen*, showing the centres of increasing population. With the exception of the London district, these were almost entirely confined to the great coal-fields of the North, the Midlands, and Wales. Nothing could be more eloquent of the change which has been going on during the last hundred years.

6. Natural resources.

Such terms as "the north" and "the midlands" are rather

vague. An effort to be more precise leads naturally to the partition of the country into counties. In studying the boundaries of these, the advantage of a knowledge of the physical features, of the rivers and mountain ranges, will at once be apparent. In learning their positions, some advantage may be derived from beginning with one's own particular county, and working outwards through those that border on it. The greater number of the counties are shires, that is "shares" or portions cut off from the whole, and may perhaps best be learnt from the capitals whose names they bear, as Warwick, Northampton, Cambridge. Others recall the districts formerly occupied by particular tribes or divisions of races: such are Middlesex and Sussex, Norfolk and Suffolk, Kent and Devon, Cornwall and Cumberland.

7. Administrative divisions.

Simple explanations of the meaning of these names serve, by stimulating interest, considerably to lighten the labour of learning. This is equally true of the names of towns, which should also be explained as far as possible. London and Dundee recall each an early Celtic *dun* or elevated fort, just as Aberdeen and Aberdovey indicate Celtic settlements at the mouth (*aber*) of the rivers Dee and Dovey. Manchester Lancaster, Leicester, similarly denote the position of Roman *castra* or camps. Harwich and Berwick on the other hand are Norse names, formed from the word *vik*, a creek, best known to us in "viking." The innumerable "tons" and "hams," such as Wellington and Nottingham, recall the wide-spread nature of the Anglo-Saxon invasion, while "burghs" or "boroughs" like Edinburgh and Peterborough indicate the more important towns of the same period. Naturally the same terminations are to be met with in Germany, as in Hamburg, Magdeburg, Hildesheim. On the other hand *-by*, as in Derby and Grimsby, is a Danish termination, whose more limited

Etymological explanations.

distribution recalls the more limited effect of the Danish invasion. Some care must be always exercised in etymological explanations. Names not unfrequently become considerably changed in course of time, and the apparent meaning of a word often differs from the real. Barmouth and Yarmouth, for example, closely resemble each other; but while the latter derives its name from its position at the mouth of the Yare, in the case of the former it is the first half of the word which indicates the position at the mouth, and the last half the name of the river on which it stands, the name being a corruption of Aber-mawddach.

A systematic survey of a country on the lines just sketched, beginning with its position and size, passing on to its outline and relief, and then to its river systems, resources, centres of population and administrative divisions, cannot fail to stimulate and interest by the logical sequence and consequently easy comprehension of the points successively presented.

The framework once complete, the details can be added to any desired degree. The minor mountain ranges, the tributary streams, the less important towns, will all fall naturally into their places without confusing the main features, which it is of the first importance to accentuate.

After the British Isles, will naturally follow the study of Europe, and, after Europe, that of the other continents. It is unnecessary to deal with each individually; the system in all cases should be similar to that already described. The only difference will be one of degree. In larger or less important districts the lines must be bolder, but the method to be pursued is in all the same. The only caution needed is to urge the advisability of not essaying too much at once. It is better to study one continent well than half the world indifferently.

The value of etymological explanations is probably even greater in the case of places abroad than when dealing with the more familiar names in our own islands. To take only a few

examples, Coblenz will always be the historic instance of a town built at the confluence of two rivers. The origin of the word once known, its site can never be forgotten. Provence recalls the position of part of the first Roman province in Gaul; Zaragoza the Roman town of Cæsaraugusta in Spain. Similarly Guadiana and Guadalquivir, compounds of the Arabic word for a stream (*wadi*) often met with in Egypt, remind us of the long dominion of the Moors in southern Spain.

To invoke the aid of etymology is merely to adopt a principle which, consciously or unconsciously, is found by all an aid in learning ancient or modern tongues; and, just as the committal to memory of a vocabulary of words would be of but temporary effect without the familiarity to be gained from their frequent use in reading or composition, so the permanent retention of the names of a number of towns and rivers, and of their positions, can only be expected when means are adopted to render these familiar. The processes corresponding to reading and composition are, in Geography, Map-study and Map-drawing.

A map, as a complex expression of an infinite number of geographical data, requires careful study. A complete and well-drawn map will tell not only the size and outline of a country, but the relief of the surface, the character of the coast, the courses and navigability of the rivers, the size as well as the position of the towns, the administrative divisions, the roads, canals, and railways; thus supplying an immense variety of information, which can no more be grasped at a glance than the complex contents of a book can be adequately comprehended by the cursory perusal of a single sheet. The effect, too, produced upon the inexperienced by such a map is as repellent as if all the courses of a dinner were set before one at the same moment. It is well therefore, for educational purposes, to have different maps dealing with different points. Two at least there should be, one emphasising the physical

Map-Reading.

features, the other the political. A good school atlas will add to these others showing the distribution of rainfall and of population, and possibly the isotherms and artificial lines of communication, at least for the more important countries. By the study of individual points on separate maps, the eye becomes able to distinguish them when combined on a single sheet.

Map-reading has its natural corollary in map-drawing. A teacher of languages knows the value of composition, as of analysis; a teacher of science makes his pupils repeat the experiments which they have seen. Map-drawing, besides impressing geographical facts on the memory, has the additional value of being a form of manual training, and of ministering to the desire, innate in most boys, to use their fingers in making marks.

Map-Drawing.

By map-drawing, however, map-tracing is by no means meant. To set a number of boys to trace laboriously a map from an atlas, and to reward the one who inserts the largest number of names in copper-plate handwriting and paints the boundaries in the brightest colours, may afford employment for idle hands, but will in no wise advance geographical knowledge. Nor can any of the systems of "memory-maps" be recommended, requiring as they do the construction of an elaborate system of squares and angles, arcs and triangles, remotely resembling the outline of the country to be drawn. A map is not like a building, whose scaffolding, needed for its construction, is removed at a subsequent stage: it is laid out on a network of lines of latitude and longitude which must remain permanently for the identification of positions. No system of map-drawing which is not based on the use of these lines is satisfactory, just as no symbol (such as a black line for a range of mountains) which is not used in ordinary maps should be permitted.

It is not necessary to enter into the question of different projections. For practical purposes the simplest is the best.

The lines must be straight, for the instruments for curved lines are not usually available. Lines of latitude will be equidistant and parallel, lines of longitude will converge towards the poles. This presents the only element of difficulty. To determine the distance between the meridians of longitude on any parallel of latitude is within the power of any boy with an elementary knowledge of geometrical drawing. It is only necessary to draw a quadrant of a circle with a radius equal to the distance between the parallels of latitude, to divide, with the help of a protractor, the arc of the quadrant at an angle equal to the degree of latitude in question, and to drop a perpendicular from this point to the upright arm of the quadrant; this line will give the required distance. For general purposes it is only necessary to determine these distances for the top and bottom parallels, to set off, on either side of a central meridian, as many spaces as meridians are needed, and to join the successive pairs of corresponding points. An example will best show the stages to be followed. Suppose a map of England to be required. First draw a line down the middle of the paper, as a central meridian. As England lies between the parallels 50° N. and 56° N., set off along this line six equal spaces of the length of, say, $1\frac{3}{4}$ inches (see below). Draw, through the points thus obtained, lines across the paper at right angles to the central meridian. This will give the seven parallels of latitude, which should be numbered from 50° to 56°. Take a pair of compasses, and with centre the point where the lowest parallel cuts the central line, and with radius the distance ($1\frac{3}{4}$ inches) to the next parallel, describe a quadrant. Divide this arc at 50° and 56° and drop perpendiculars to the central line. These will give the distances between the meridians on the top and bottom parallels. Along the lowest parallel set off, on each side of the central line, four spaces equal to the longer perpendicular, and, on the top parallel, a similar number each equal to the shorter perpendicular. Join the points by straight lines,

and a network will be obtained composed of seven parallel and equidistant lines across the paper and nine converging towards the top. The central one of these latter is the meridian 2° W. of Greenwich, and both it and the others should be numbered accordingly. For the distance between the parallels, $1\frac{3}{4}''$ has been suggested above, but we may take any distance which the size of the paper permits. With $1\frac{3}{4}''$ as the distance between two parallels, the scale of the map is $\frac{1}{2500000}$, and the spaces to be marked off on the parallels 50° and 56° will be $1\frac{1}{8}''$ and $1''$ respectively.

The framework having been drawn, the outline can soon be added. Note, by comparison with an atlas, where the coast cuts the network of lines. Mark these points and draw the outline in sections from mark to mark. It is astonishing how frequently the coast cuts a line halfway, or a third of the way, between its points of intersection with two other lines, or even at one of the points of intersection. The points are easily learnt, and, with a little practice, a complete map can be accurately drawn from memory.

Memory Maps.

After the outline is finished, the rivers, mountains and chief towns can be added. It is quite possible in the limited time usually devoted to Geography to teach even a form of junior boys how to make such a map so that five-sixths of them will be able to reproduce it accurately from memory at the end of term.

The same principle can be adopted for a map of any country. For larger areas, like France and Spain, it is better to draw the lines at intervals of 2°, and for continents like Africa at 10° or 20°, so as not to have too many lines. The distortion produced by drawing all the lines straight is insignificant in the case of small areas, such as the countries of Europe, and even in that of large areas when, like Africa, they are near the equator.

It is a useful exercise to draw the chief countries of

Europe, for purposes of comparison, on the same scale. If 2° of latitude be made equal to $1\frac{3}{4}$ inches, the scale will be $\frac{1}{5000000}$. On this scale most countries can be drawn on an ordinary-sized sheet of paper[1]. If such a series be drawn, astonishing results will follow when one map is compared with another. Map-drawing on this method is not only an excellent discipline and a stimulating exercise, but it has the additional value of teaching the latitudes and longitudes of important points. It is instructive to quote in this connexion a remark made late in life by a great geographer, who was both scholar and administrator:—"I wish I had been forced as a boy to learn latitudes and longitudes; they would have been invaluable to me all my life."

As the map of England is by no means one of the easiest to draw, it might be well to begin with something simpler, as, for instance, the map of South America. In this case the construction of the network of lines of latitude and longitude presents but few difficulties. The lines of latitude will be first drawn, at intervals of ten degrees. One of them will be the Equator. As a degree of longitude on the Equator is equal to a degree of latitude, mark off along the Equator, on either side of a central meridian, spaces equal to the distance between the parallels. From these points the meridians will converge towards the top and bottom of the map. The lowest parallel needed is 60° S. On the 60th parallel the length of a degree of longitude is just half what it is on the Equator. Set off therefore, on the lowest parallel, spaces just half the length of those on the Equator. Join these points to those on the Equator: then, on parallel 20° S., the distance between any two consecutive meridians will give the length of the spaces to be set off on the topmost parallel, which

[1] For comparison, England will have to be drawn just half the size of the map described on p. 175, which was on double this scale.

will be 20° N. It will be found that the coast of South America frequently cuts the point of intersection of two lines, and can readily be drawn.

Economic Geography.

The economic aspects of Geography, which have been ably handled in several well-known books under the title of commercial or applied geography, present, when properly taught, many features of great interest. The varied products of the diverse regions of the world, the great lines of communication by land and sea, the marts and factories of the nations, the growth and development of commerce, are all subjects of high importance; but, if reduced to mere catalogues of imports and exports, they easily become repulsive.

Economic geography, for the adequate study of which a knowledge of physical and political geography is indispensable, is best taught at a later stage. It affords indeed a valuable field for the correlation of facts already learnt.

A detailed discussion of methods to be followed would be impossible here. A single instance must suffice by way of suggestion. In considering the economic geography of England, cotton will naturally claim a foremost place. A picture of a cotton plant, specimens of raw cotton, of cotton yarn and of cotton cloth should be obtained as illustrations to appeal to the eye. The eastern and early origin of the manufacture of cotton should be pointed out. The name itself is of Oriental origin, and "calico" is derived from Calicut, the former Indian centre of export. In England the manufacture of cotton dates from comparatively modern times, probably from about the middle of the seventeenth century, though, curiously enough, the word cotton was already connected with Lancashire at an earlier period. Camden, a sixteenth century writer, speaks of "woollen clothes which they call Manchester cottons," whence we conclude that imitations of cotton cloths were then made of wool, just as now the process is reversed. The inventions of Hargreaves,

Crompton, and Arkwright in the latter half of the seventeenth century led to an immense development of the cotton industry in Derbyshire, Nottinghamshire and Lancashire, where rapid streams supplied good water-power. The invention of steam-engines made the proximity of a coal-field of more importance, while, for an industry dependent on foreign lands both for supplies of raw material and markets for the manufactured product, an adjacent seaport was found a prime necessity. Hence the industry became concentrated in Lancashire, where the damp climate proved an additional advantage for the spinning of fine yarns, and Liverpool rapidly developed into a leading port.

The demand for raw material has led to interesting developments in the cultivation of the cotton plant. A hundred years ago, nearly all our cotton came from the West Indies or from Asia Minor. The United States are now our chief source of supply, while Egypt and India have been lately drawn upon to an increasing extent.

History of geographical discovery.

The history of geographical discovery is another branch of geography which should not be overlooked, forming as it does an admirable introduction to the study of many parts of the globe. In Africa, Australia and the New World is this especially the case. All down the west coast of Africa the early Portuguese explorers have left traces of their progress in names that are still used. The Cape of Good Hope recalls the turning point in their long struggle to penetrate round Africa to India, the point at which the end of the continent seemed at length to have been reached. Natal was named by Vasco da Gama as the spot where he spent Christmas day on his first great voyage to the East.

In the New World, along the eastern coast of S. America, the stages of exploration are recalled by many names: such are Cape St Augustine, so called because discovered on that saint's

day; Bahia, that is the Bay, whose full name is the Bay of All Saints, reached on Nov. 1st; and Rio de Janeiro, similarly reached on the first of January. The term West Indies recalls the great but natural mistake of their famous discoverer Columbus, who fancied he had reached the east by sailing west, while America perpetuates the name of Americus Vespucius, who first realised that a new world had been unveiled. The straits of Magellan in the south and those of Davis in the north received their names in commemoration of their first explorers, just as Nova Scotia and New England are called after the homes of their early settlers.

In conclusion, it is only necessary to point out that, while soundness of method is essential, success in the teaching of Geography, as in that of other subjects, depends chiefly on the enthusiasm and knowledge of the teacher. In hardly any branch of education is the tyranny of the text-book more despotic; in none can it with greater advantage be abolished. This, however, cannot be accomplished without adequate training of the teacher, for the efficient performance of whose task the vague reminiscences of his own school education in no wise suffice. An important step has just been taken by the University of Cambridge in the constitution of an independent "group" of geographical subjects as part of the syllabus of its Higher Local Examination, a new departure which will doubtless supply a valuable incentive to study, while placing a recognised certificate of competency within the reach of students who desire to qualify as teachers of Geography.

CHAPTER VII.

ALGEBRA.

When Mr Isaac Newton published what would now be called a treatise on elementary algebra, he gave it the title *Arithmetica Universalis;* that is to say universal, or generalised arithmetic. Now although algebra, in its widest sense, includes much more than this, and is not so much a generalised arithmetic as a specialised logic, it remains true that the natural approach to the study of it is by the way of ordinary arithmetic.

Let us suppose, for instance, that the scholar has become acquainted with the ordinary notation for integers, and the symbols of operation required to indicate the processes of addition, subtraction, multiplication, and division. Let us further suppose that he is able to perform the four operations, and fully understands the meaning of them. Then he will discover by reflection, or at least perceive when it is pointed out to him, that there are certain general truths connected with these operations which are independent of the particular numbers upon which the operations are performed. These laws may, of course, be stated in general terms, without the use of any new symbols: but algebra provides us with the means of expressing them in a concise and convenient form, which is more easily taken in by the eye, and therefore by the mind, than the longer verbal statement.

Arithmetical Algebra.

Take, for example, the commutative law of multiplication. If I make on the blackboard a row of six crosses, and below it four other similar rows of six, I obtain five rows each containing six crosses, and the total number is therefore five times six. But it is clear that I have, in the same diagram, six columns each containing five crosses, so that the total number is also six times five. Therefore five times six is equal to six times five. The argument is perfectly general, and we conclude that, if any two whole numbers are taken, the product of the first by the second is equal to the product of the second by the first. This is a complete statement of the arithmetical law in question, and does not involve any algebra: we express it in the notation of algebra by the formula

$$a \times b = b \times a,$$

where a, b denote any two whole numbers.

In the same way an arithmetical proof should be given of the other fundamental formulae such as

$$a + b = b + a,$$
$$a + (b + c) = (a + b) + c,$$
$$a(b + c) = ab + ac,$$
$$a^m \cdot a^n = a^{m+n},$$

and so on: it being expressly stated that all the letters stand for whole numbers.

There is no reason whatever why all study of algebra should be postponed until the whole of arithmetic has been mastered: of course it cannot be begun until the scholar has acquired a certain power of abstract reasoning.

The solution of simple equations, and of problems which lead to them, may also be done at a very early stage. The advantage of this is that the pupil's interest in the applications of algebra is aroused, and he is compelled to work in an intelligent way. The problems cannot be too easy at first,

and they should be carefully graduated; every step of the analysis should be explained, and justified by reference to an axiom or otherwise. There are two points which require special attention. The first of these is that an algebraical symbol, such as x, always denotes a number and never a concrete quantity; the second is that the symbol = means "is equal to" and never means anything else. For some mysterious reason a large proportion of students persist in writing such nonsense as "Let $x =$ a pound of tea," or "Therefore $\sin\theta = \frac{1}{2} = 30°$"; it is absolutely necessary to make them see that statements of this kind are mere gibberish.

The crucial difficulty of elementary algebra is the introduction of negative numbers and the rules of sign. It cannot be asserted too strongly that such an expression as $2 - 5$ has no arithmetical meaning whatever: from a purely arithmetical point of view it is as unintelligible as $\sqrt{-1}$. But we can give a meaning to the statement that

Rules of Sign.

$$+2 - 5 = -3$$

namely that "an addition of two followed by a subtraction of five is equivalent to a subtraction of three." This gives us a kind of interpretation of -3, but it does not tell us how to interpret such expressions as $a + (-3)$ or $a - (-3)$: to do so, we may have recourse to the formula

$$a - (b - c) = a - b + c.$$

This we suppose to have been proved in the case when all the operations involved are arithmetically possible. If, now, we put $b = 0$, $c = 3$, or $b = 1$, $c = 4$, or $b = 2$, $c = 5$ and so on, we obtain in each case $a - (-3)$ on the left-hand side, and on the right-hand side

$$a - 0 + 3, \quad a - 1 + 4, \quad a - 2 + 5, \text{ etc.},$$

that is, in every case, $a + 3$. Thus analogy leads us to

$$a - (-3) = a + 3,$$

and since no restriction has been placed upon a, we write

$$-(-3) = +3.$$

In the same way by generalising

$$a + (b - c) = a + b - c$$

we are led to

$$+(-3) = -3.$$

The rules of sign for multiplication and division may be derived in a similar way from

$$(a - b)(c - d) = ac + bd - bc - ad,$$

assumed to be perfectly general. The formula should, of course, be first proved with the help of a diagram when a, b, c, d are positive integers and $a > b$, $c > d$. Then by putting $a = 0$, $c = 0$ we are led to infer that, if the formula is to hold universally,

$$\begin{aligned}(-b)(-d) &= 0 \cdot 0 + bd - b \cdot 0 - 0 \cdot d \\ &= +bd,\end{aligned}$$

and so for the other cases.

The reasoning here employed pervades the whole of algebra. A certain formula is shown to be true under certain restrictions as to the meaning of the symbols employed. If, by an extension of the meaning of these symbols, the formula can be made to retain its validity, and if the extended interpretation does not involve any logical inconsistency, we are justified in making the extension, and, in a manner, compelled to make it by the demands of the calculus itself. That a formal science like algebra, the creation of our abstract thought, should thus, in a sense, dictate the laws of its own being, is very remarkable. It has required the experience of centuries for us to realise the full force of this appeal; and it is therefore unreasonable for a teacher to expect his pupils to appreciate it all at once. A certain amount of

compromise appears to be inevitable. Just as practical geometry may fitly precede the systematic study of the science; just as experimental demonstration of physical laws helps to the comprehension of abstract dynamics: so the practical application of the laws of algebra, before their logical necessity is fully realised, is not only harmless, but even helpful towards the complete understanding of the very abstract considerations upon which their general validity is based.

The proper course would therefore seem to be to exercise the student as soon as possible in the practice of the fundamental rules by applying them to rational integral functions of a single variable: the process (without the theory) of finding the highest common factor of two polynomials is particularly valuable for this purpose.

Incidentally the notion of *degree* should be explained, and the analogy with the decimal system of notation pointed out: something may be said, too, about scales of notation.

Before leaving the subject of rules of sign, it is desirable to call attention to the distinction between negative *numbers*, and negative *quantities*. Negative numbers are introduced in order to render rational algebra formally complete; negative quantities appear in the application of algebra to concrete problems. This is best shown by means of an example. Thus: "A man 36 years old has a son aged 4: when will he be three times as old as his son?" If we suppose that it will be in x years, then

Negative Quantities.

$$36 + x = 3(x + 4),$$

leading to $x = 12$; and the answer is that it will be after 12 years. But if we say "A man is 36 years old and his son is 16 years old: when will he be three times as old as his son?" the corresponding equation is

$$36 + x = 3(x + 16),$$

leading to

$$x = -6.$$

Now there is no sense in saying "It will be after – 6 years" and, if we consider the problem, it soon appears that it does not admit of an answer, because as time goes on the ratio of the father's age to that of his son grows smaller, and it is less than that of 3 to 1 at the start. Thus the negative answer is, in the first place, an indication that the problem, as put, is insoluble. But the definite value of x invites consideration: and if we reckon back six years we find that the father was then 30 years old and his son 10 years old, one being three times as old as the other. Thus the negative value of x suggests an amended form of the question, which does admit of an intelligible answer: namely, "A man is 36 years old, and his son 16 years: when *was* he three times as old as his son?" If we suppose it was x years ago, our equation is

$$36 - x = 3(16 - x)$$

whence

$$x = 6,$$

and the answer is "six years ago." Now, if we look at the two equations relating to the two last problems, we see that one is derived from the other by changing x into $-x$; consequently the answer to the one is obtained from the answer to the other by a change of sign. This change of sign is accompanied by a change of interpretation; "– 6 years ahead," which is (strictly) unintelligible, becomes "6 years ago," which is quite intelligible. In order to obtain an intelligible result, we have recast the problem: *but this recasting has been suggested by the negative answer and the working out of the new equation has been really superfluous.* Now this is typical of all questions of a similar kind: it constantly happens that a negative (unintelligible) answer with a particular interpretation becomes a positive (intelligible) answer with a different interpretation. Debt and credit, past and future, forward and backward are in this connection correlative terms; and a negative quantity of the one is

interpretable as a positive quantity of the other. This fact, as De Morgan pointed out very clearly (article "Negative and Impossible Quantities" in the *Penny Cyclopædia*), simplifies the applications of algebra very considerably. In questions which may involve a difference of quality in the answer we may assume the quality, and solve our equation or equations: a positive answer is immediately interpretable, a negative answer is not: but we may make use of the negative answer by changing its interpretation, and thus spare ourselves the trouble of starting afresh. The result is that the signs + and − have a double capacity; they are symbols of operation and also symbols of quality; and it is owing to the fact that this double function does not lead to any ambiguity that the applications of algebra to concrete problems are comparatively simple in character.

It will be seen that the course sketched out involves, so far, rational operations only; it excludes all questions of roots, and also that of algebraical fractions. So far as relates to the operation of division, it should be pointed out that the process can be carried out until the degree of the remainder is less than that of the divisor; and it should be verified that if the division of A by B leads to a quotient Q and a remainder R, then

$$A = QB + R.$$

Factors.

A very important subject that may be taken up now is that of factors. Even the best of the elementary text-books treat of this in a more or less unsatisfactory way; and their want of method is encouraged by the type of question set in elementary examinations. To say "factorise so-and-so" is perfectly indefinite: any algebraical expression may be factorised in any number of ways. The proper course to take is first of all to consider the resolution of whole numbers into their prime factors; then to consider the resolution of rational integral functions of one variable

with rational integral coefficients into the product of irreducible factors of the same kind; then the resolution of binary forms such as $x^2 - 3xy + 2y^2$, then that of simple ternary forms such as

$$x^3 + y^3 + z^3 - 3xyz,$$

$$x^2(y - z) + y^2(z - x) + z^2(x - y),$$

and so on. Quadratic, and even cubic or biquadratic equations with rational roots may be solved at this stage, and also problems leading to them. Equations should always be reduced to the form $X = 0$, X being a polynomial in x, and the solution shown to be equivalent to the factorising of X. Attention should be drawn to algebraic symmetry and to the importance of degree and homogeneity.

After this naturally comes the discussion of G.C.M. and L.C.M. and the theory of rational fractions; based, of course, upon the corresponding parts of arithmetic. I do not see why the elements of the theory of partial fractions should not be included. The general proof of the rule for G.C.M. may be postponed, but its principle may be illustrated by particular examples.

When a class is able to perform all the rational operations of algebra with ease and accuracy, the teacher may follow the subsequent order of any good text-book or vary it at his own discretion. It is not my intention to try to discuss in detail all the subjects included in an ordinary school course of algebra: I have tried to indicate what I think is the proper way of dealing with the rudimentary part, which is after all the most difficult: I will merely add a few remarks upon particular points.

One great difficulty is the summation of the convergent geometrical progression

Geometrical Progression.

$$1 + r + r^2 + r^3 + \ldots \text{ ad inf.}$$

After proving that the sum of the first n terms is

$$\frac{1}{1-r} - \frac{r^n}{1-r},$$

it is usually said that "when r is a proper fraction r^n can be made as small as we please by taking n large enough." This, of course, is true, but it is not obvious without proof; and the proof is so easy that it ought, I think, to be given. Thus, suppose a is positive and greater than 1: then we may put

$$a = 1 + y,$$

where y is positive. Then

$$a^2 = 1 + 2y + y^2 > 1 + 2y,$$
$$a^3 = a^2(1+y) > (1+y)(1+2y) > 1 + 3y + 2y^2$$
$$> 1 + 3y$$

a fortiori.

Proceeding thus, we prove by induction that, if n is any positive integer,

$$a^n > 1 + ny,$$

and therefore a^n may be made as large as we please by taking n large enough.

Now if r is positive and less than 1, $\frac{1}{r}$ is positive and greater than 1: hence

$$\left(\frac{1}{r}\right)^n, \text{ that is, } \frac{1}{r^n}$$

increases without limit as n does, and therefore r^n decreases without limit. If r is a negative proper fraction, say $r = -s$, then $r^n = (-)^n s^n$, and this decreases numerically without limit as n increases.

It is very important that the student should see that the series does not converge merely on account of the terms

becoming infinitesimal: it is advisable to give the example of such a divergent series as

$$1 + \frac{1}{2} + \frac{1}{3} + \ldots + \frac{1}{n} + \ldots$$

in order to make this perfectly clear.

Surds.

Another hard subject is that of surds. Here again the treatment of the text-books is generally incomplete and unmethodical. It is best, I think, to show how quadratic surds present themselves in the factorising of quadratic forms, and to give some idea of the arithmetical properties of surds as the limits of rational approximations: thus, for instance, $\sqrt{2}$ is the limit of either of the series

$$1,\ 1{\cdot}4,\ 1{\cdot}41,\ 1{\cdot}414, \ldots$$

$$1,\ \tfrac{3}{2},\ \tfrac{7}{5},\ \tfrac{17}{12}, \ldots$$

the first of which is derived from the ordinary process of extracting the square root, and the other from the continued fraction $1 + \cfrac{1}{2 + \cfrac{1}{2 + \ldots}}$. After this, some kind of satisfactory proof can be given of such statements as $\sqrt{2} \cdot \sqrt{3} = \sqrt{6}$. It may also be shown how rational functions of quantities of the form $p + q\sqrt{r}$, where p, q, r are rational numbers, may be reduced to the form $a + b\sqrt{r}$, where a, b are rational. Without going very deeply into the subject, it is thus possible to give an introduction to it which is sound and methodical so far as it goes, and not a chaotic mass of more or less empirical rules. The same remarks apply to the treatment of indices and logarithms.

How far a school course should extend depends upon circumstances. The capacity for appreciating algebra varies very widely; and what is hopelessly difficult to one is easy enough to another. One thing ought to be said; the science of algebra, properly so called, is a consistent whole, and such

phrases as "algebra up to simple equations" or "algebra up to the binomial theorem," although convenient, are misleading if they are taken to imply distinct divisions of the subject. And it is important that the subject itself should not be obscured by the multiplicity of its applications. It is true that, for the learner, these applications are invaluable; but it is a pity when a really capable boy spends all his time in solving "catchy" problems and summing fantastic series, when he might be going on with the study of things of vastly higher importance, such, for instance, as the theory of determinants, the theory of equations, and the convergence of infinite series.

As regards the average boy, it is much better that he should do a little well and accurately than that he should be forced to try too much and degenerate into an inferior calculating-machine. It is impossible to pay too much attention to the rudiments; and accuracy must be insisted upon at the outset. The habit of careless and slovenly work, once acquired, is very difficult to cure; and it leads to a state of mind which is very hurtful in things other than mathematical.

Above all, the work should be intelligent, and not merely mechanical. It is quite true that algebra is in itself a purely formal science, governed by a bare half-dozen of fundamental laws; it is true also that familiarity with these laws can be best acquired by the practice of purely formal operations. But it is the teacher's duty to see that all these mechanical calculations are only means to an end: and he must shun the temptation, that so often presents itself, to encourage the merely imitative instincts of his pupils at the expense of their reasoning faculties. It is comparatively easy to teach algebra in a way which earns marks in an examination, but is almost, if not quite, worthless from an educational point of view. It involves no more training of the mind than the doing of "sums" by means

Reason *v.* Rote.

of rules which have been learnt by rote: and it has not even that practical use which may be urged in defence of mechanical arithmetic.

Importance of sound Rudiments.

In conclusion it may be remarked that, other things being equal, that teacher will best instil the elements of the subject who knows most about it as a whole. His knowledge of what is to come will guide him in laying a solid foundation, and secure his pupils from having anything to unlearn. One of the most trying of a University teacher's experiences is to be asked to give instruction in comparatively advanced mathematics to a student whose elementary training has been deficient or erroneous. To correct his mistaken notions, and to fill up the gaps in his knowledge, is harder than it would have been to teach him from the very beginning. It is often quite impossible to repair the mischief that has been done, because the ill effects of his earlier training have become inveterate.

It is a very good thing, with this end in view, to refresh and improve one's knowledge by the occasional study of a really scientific treatise, such as Chrystal's *Algebra*, or the perusal of philosophical discussions on particular points, for instance De Morgan's articles in the *Penny Cyclopædia*, one of which has been already referred to. As to elementary text-books, there are so many good ones available that it would be invidious to make a selection: unfortunately there are still some which are not all that could be desired, but their defects are usually obvious to the competent observer. Speaking generally, it may be said that small text-books drawn up to meet the requirements of particular examinations should be avoided.

CHAPTER VIII.

GEOMETRY[1].

In order to decide upon the proper method of teaching any subject whatever, it is obvious that we ought to have definite notions as to our reason for teaching it at all, and that we ought to keep these notions clearly before us during our teaching, so that every stage of it may tend to their perfect realisation.

Why, then, do we teach geometry?

The objects of Mental Education are, I take it, in the main three:—

Aims of Education.

Firstly—The opening of the mental eye to all the mystery of the world around, or, to put the matter otherwise, the awakening of the faculty of wonder, it being as true now as it was when those remarkable words were first uttered, that 'He that wonders shall reign, and he that reigns shall rest.'

Secondly—The due training of the mental eye, the abolition of mental colour-blindness and mental astigmatism, and the acquisition of mental perspective.

[1] This chapter is an abridgment of a paper read before the Bath Branch of the Teachers' Guild in May 1891, and published, during the same year, in the July and August numbers of *The Practical Teacher*. It is reprinted here by the kind permission of Mr Joseph Hughes, the late Editor of that Magazine.

Thirdly—The gathering, classification, and orderly arrangement of useful knowledge—knowledge, I mean, which is to prove itself useful in the acquisition of other knowledge, not in any sense knowledge which has its monetary market value, for I cannot admit that a subject like Book-keeping, to take one example of several that present themselves, which has but a paltry bread-and-butter utility, has any true place or part in a rightly planned Scheme of Education, and am, indeed, inclined to believe that the very utility, as distinguished from the usefulness, of a suggested subject of Education is in part its condemnation also.

Mathematics in Education.

Now Mathematics in the elementary stages can do but little towards the realisation of the first aim. The Wonderland exists, it is true, but it comes only after long and toilsome marches, which cannot be avoided by any short cuts whatever. 'There is no royal road to Geometry,' as Euclid himself told the great Ptolemy Soter, when in search of a short cut thither for kings.

But the Wonderland exists, I repeat, and its wonders repay the march. I venture to assert that the feelings one has when the beautiful symbolism of the Infinitesimal Calculus first gets a meaning, or when the delicate analysis of Fourier has been mastered, or while one follows Clerk Maxwell or Thomson into the strange world of Electricity, now growing so rapidly into form and being, or can almost feel with Stokes the pulsations of the light that gives nature to our eyes, or track with Clausius the courses of molecules we can measure, even if we know with certainty that we can never see them—I venture to assert that these feelings are altogether comparable to those aroused in us by an exquisite poem or a lofty thought.

For the average schoolboy, however, these considerations are beside the mark. The Wonderland of Geometry, at all events, lies far beyond most of our pupils. You may tell them if you like that the same two points are common to every

circle in a given plane, that, draw your circle where you like, you cannot get away from them, that these two points have many wonderful properties, as, for instance, that any tangent from them to an ellipse passes through a focus of that ellipse; you may hint at the possibility of Geometry of Four Dimensions, in which spheres can be turned inside out, and knots tied on endless cords; but, for all your trouble, your pupils will stolidly disbelieve you, nor will you have rendered their mental horizon one degree the wider.

For much the same reason we are debarred from pleading the *third* of our Educational objects. Geometry is not of much use—save to the mathematician—as a basis for building other knowledge upon. Yet this motive should not be altogether lost sight of. It will serve us in good stead with that awkward youth who is always sulkily asking us the wherefore of all these triangles, parallelograms, and circles. It is no use to tell him that they are whetstones for his wits. He is not aware that his wits need sharpening, nor would he greatly relish the prospect if he were. Indeed, he regards his discovery of the uselessness of Euclid as a proof of his already superior sharpness. So we may lawfully use lower motives with him. We may tell him that there is a Science of Trigonometry which is merely the Algebraical statement and expansion of Euclid i., 47. That it is this science which enables ships to sail in straight course, or St Gothard Tunnels to be pierced so exactly, that engineers from Switzerland and engineers from Italy meet, within an inch or two, in the centre of the mountain after five miles of independent burrowing from opposite sides, and we can thus, *experto crede*, inspire the dullest with a kind of interest in his work.

But the teacher *must* regard the main function of Geometry as being Intellectual Discipline. And, just because Geometry is the most perfect discipline ever invented by man, Plato's

motto μηδεὶς ἀγεωμέτρητος εἰσίτω should be over the porch which leads to all higher learning, that no undisciplined foot may profane it by devious illogicality.

Let us now descend from the high ground of theory to the practical questions—what shall we teach, and how shall we teach it?

I. Shall Geometry mean Euclid, or shall it mean Euclid's 'Modern Rivals'?

Euclid's Modern Rivals.

I am sufficiently conservative to believe that, for the teachers of the young, it ought to mean Euclid and not the Association Syllabus. Euclid has great and grave defects, some of which are easily removed, some of which are inherent in his method. These have been stated once for all by De Morgan[1] in his masterly article on Euclid's life and works. He 'never condescends to hint at the reason why he finds himself obliged to adopt any particular course. Be the difficulty ever so great, he removes it without mention of its existence.' But the teacher can condescend, and the teacher can give himself the pleasure of mentioning the difficulty, as a preface to the still more exquisite pleasure of removing it. 'He has not the smallest notion of admitting any generalised meaning of a word, or of parting with any ordinary notion attached to it. Setting out with the conception of an angle rather as the sharp corner made by the meeting of two lines than as the magnitude which he afterwards shows how to measure, he never gets rid of that corner, never admits two right angles to make one angle, and still less is able to arrive at the idea of an angle greater than two right angles.' Yet, after all, 'these objections refer to matters which can be easily mended. No one has ever given so easy and natural a chain of geometrical consequences. There is a never erring truth in the results..... The strong inclination

[1] Smith's *Dictionary of Greek and Roman Biography*, Article 'Eucleides,' vol. ii., p. 65. The quotations are from thence.

of editors to consider Euclid as perfect, and all negligences as the work of unskilful commentators or interpolators, is in itself a proof of the approximate truth of the character they give the work; to which it may be added that editors in general prefer Euclid as he stands to the alterations of other editors.'

We ought to adopt the Elements of Euclid, I say, partly because they are themselves exquisitely adapted to our purpose of mental discipline, partly because there is no hope whatever of any general consensus as to a suitable substitute, and partly because the book which was used 2,000 years ago in the schools of Alexandria has gathered round it a halo of associations not in themselves devoid of educational value.

II. Whose Edition shall we use?

The Best Edition.

Need I say that no edition is perfect? We teachers understand each other, and we know that each one of us is firmly convinced in his secret soul that on his own particular hobby the perfect book will not have been written until he writes *Finis* at the end of his *magnum opus*. But, on the whole, the edition of Hall and Stevens (Macmillan) best realises my wishes. To this, however, the teacher ought to add, for his own private use, at least three other editions, namely, Mackay's[1] (W. and R. Chambers), which will supply him with a large assortment of the easy Riders to which I shall subsequently refer, *The Harpur Euclid* (Rivington), and *The Elements of Plane Geometry* (Sonnenschein). If he cares to add more, and in this subject there is eminent wisdom in a multitude of counsellors, the next three should be *The Pitt Press Euclid*

[1] This is in many respects the best school edition in existence, but the typography is disagreeable, and it seems to me a grave mistake to turn Book II. into Algebra by the use of *minus* and indices. There can be no doubt that AB^2 had no meaning whatever for Euclid, and has only a wrong and ungeometrical meaning for the average schoolboy.

(Cambridge Press), Deighton's (Deighton, Bell), and Casey's (Dublin Press).

For Junior Forms the edition of Layng (Blackie) is admirable. *A First Step in Euclid* by Bradshaw (Macmillan) contains many valuable hints for the teacher.

III. I proceed now to make some unmethodical remarks upon Method.

The Definitions. It is wrong to treat these as a mere repetition lesson. Have your class round your blackboard, and try to make them up for yourselves. At least half the definitions lend themselves to this. You will have difficulty with the fundamental notions of point, line, and surface—but the difficulty is metaphysical and must be slurred over. Euclid's definition of a straight line as 'that which lies evenly between its extreme points' is bad, a wordy periphrasis which states that all which he can tell us of a straight line is that it is straight. But it is dangerous to tell your pupils that Euclid ever nods, and perhaps you had better leave it. If you wish to emend, you may substitute the A. I. G. T. Syllabus definition :—

Practical Hints: Definitions.

'A straight line is such that any part will, however placed, lie wholly on any other part, if its extremities are made to fall on that part.'

But when once the preliminary terms are mastered, the rest is easy. You put a triangle on the board, and by judicious questions you can elicit the whole definition. The boys will probably all know what to call it.

'Jones, what is that?' 'A triangle, sir.' 'Well, let us find out all we can about this triangle. Is it flat, or is it curved like a ball?' 'Flat, sir.' So you enter on the board—Triangle, flat figure. 'Well, what else?' 'Three corners, sir.' You enter—Triangle, flat figure with three corners. 'Are all flat figures with three corners triangles?' The boy will probably answer 'Yes.' So you draw a triangle with curved

sides. 'Is that a triangle?' 'No, sir, they're not straight.' 'What are not straight?' 'The sides, sir.' 'Oh, has a triangle sides as well? How many?' 'Three, sir.' Your board now reads—Triangle, flat figure, three corners, three sides, sides all straight. 'Is this all?' 'Yes, sir.' A little more cross-questioning, and you show him that he has stated more than he need, and reduce your definition to 'A flat figure with three straight sides,' which you have only to translate into Euclid's dialect, and you have done.

There are few more valuable exercises than for the teacher thus to get his class to state in their own words their idea of an object, whether it be a triangle, or a noun, or a chemical experiment, and then by close and lively questioning to render this popular idea correct by eliciting where it is defective or where it is redundant.

The extended non-Euclidian definition of an angle should be introduced from the first, as also should the system of measuring by degrees, so that you may refer to a right angle as an angle of 90°, and give definiteness to your terminology and teaching. You should accustom the pupil early to angles greater than 180°, and to the angle of 180°, for which you will find the term flat-angle or straight-angle useful. The motion of clock-hands will render you good service here, but, unfortunately, the makers thereof have wickedly contrived that clock-hands shall revolve negatively. A good deal of judicious cross-questioning will be required before the definitions are mastered. Mackay has five pages of masterly questions full of suggestiveness[1]. You will be surprised at the answers you obtain to 'Is a rectangle a square?' 'Is a square a rectangle?' 'If I double the arms of an angle, do I double the angle?'

[1] *The Progressive Euclid*, by A. T. Richardson (Macmillan and Co.), will also be found useful in this connection.

Postulates and Axioms.

You will point out that the Postulates are merely demands for a straight edge and a pair of compasses. If it were not for that bugbear of an examiner, I am not sure that I should not advise the almost total omission of the axioms. It is not as if they were complete. They are simply an early attempt to formulate the laws of thought. Euclid assumes several which he does not specifically mention—as, for instance, that the two circles which he draws in his First Proposition will intersect somewhere[1]. But if you must have axioms, you ought not to admit 'Two right angles are equal,' which can be validly proved without the use of any proposition whatever[2], and which has really been implicitly assumed when you were discussing the question of degrees. Moreover, the so-called 'Twelfth Axiom' must be deferred until after Prop. xvii., unless you would have trouble. At that stage, a few words upon this axiom will render the whole theory of parallels as easy as it ever can be in a world where it is unfortunately impossible for us to go to infinity to look after the intersections of our parallels.

Analysis of Propositions.

Now as to the Propositions. It is my custom to go carefully, on the blackboard, over the ground of each new proposition with the class. We treat it as a problem, or a puzzle if you will, of which we do not know the solution. We endeavour to find out beforehand how we should do it. It will often happen that a solution different from Euclid's is suggested. We analyse this carefully, and point out what reasons Euclid may have had for preferring his own. For, of course, we assume that Euclid was fully aware of ours, since in dealing with young pupils it is bad to doubt the omniscience of your author. Then we send

[1] On this whole topic of Axioms and Postulates, see the *Pitt Press Euclid*.

[2] See the *A. I. G. T. Euclid*, p. 20 (*a*). The book which is thus referred to is Sonnenschein's edition previously mentioned.

the class to their seats. We ask them to go over the proposition in their books. We draw the figure for them, topsy-turvy, and with different letters. We insist on their applying Euclid's reasoning to our figures. On no account whatever must they be allowed to learn any portion of their work by heart, not even, at first at all events, the Enunciations[1]. Our aim is Mental Discipline, not Mnemonics. Then *in the next Euclid period*, and never on the same day or in the same lesson, their knowledge is tested. Again we draw the figure for them, in some other state of topsy-turvydom, with other letters, and we ask them to write the proposition out, and mark their work accordingly. Here I may note that it is a good plan to draw that portion of the figure which is among the *data* in thicker lines, or with coloured chalk, reserving thin lines, or some different colour, for those portions which are given by the *construction*. It seems to me essential that this should be done in the Text-Book adopted for class use, as it is in most of the editions named here. But, in asking for the proposition, we endeavour to depolarise it, if I may borrow a striking phrase from Wendell Holmes. We do not ask for an equilateral triangle, we ask for a triangle with three equal sides, or for a triangle each side of which shall be 1 inch long; we do not ask our pupils to describe a parallelogram equal to a given figure and having an angle equal to a given angle, we ask for a rectangle equal to the given figure, and so forth.

Teaching of Riders.

The proposition known, the first step is taken, but only the first. The notion that the First Book of Euclid is known if we know some 48 propositions is one which has done immense harm to

[1] But the substance of the Enunciation should be learnt, and the pupil should, in writing out a Proposition, 'put in his references,' except to Axioms. This practice is a great help to orderly and systematic geometrical thinking.

mathematical teaching. We must remember that in this subject we are teachers of *method*, not of results. The proposition is not known as it ought to be, unless its principles can be applied to the solution of little problems upon it, and it is my firm belief, the result of experience, that the dullest may be taught to solve these. Herein lies, from the teacher's point of view, the supreme merit of Mackay's book; for to every proposition this editor adds a number of easy Riders or problems. These are often such as the teacher may readily make for himself, and the teacher ought indeed to keep a collection of such home-made problems. I will take a few instances.

After Proposition i. we should ask as follows[1]:—

Examples: Prop. i.

1. Draw an equilateral triangle whose sides are each 1 inch long.

A word here on behalf of so-called Geometrical Drawing. I believe that it adds definiteness to the ideas without any loss of logical power, and that its almost universal neglect by teachers of Euclid has been a great loss of power to them.

2. Show how to find a point equidistant from two given points.

This widens the conception of the meaning of the proposition.

3. How many equilateral triangles can be described on the given line? Draw them all.

When his problem has two solutions, the pupil must never be allowed to miss the fact.

4. Draw a straight line which is twice as long as a given line.

5. Given a straight line 1 inch long, show how to draw a

[1] I here borrow freely from Mackay, and from the *Pitt Press Euclid.*

straight line 3 inches long. How many ways are there of doing this?

If the principles involved in these last two problems are not fully grasped, you will extend them and ask for straight lines 4, 5, 6... inches long, as the case may require.

6. Construct an isosceles triangle whose sides are 1, 2, 2 inches respectively; 1, 3, 3, &c.

Be careful here that you do not allow the transference of length by simple movement of the compass, for, if you do, you will destroy the Second Proposition, which is of supreme mental benefit.

7. If both points of intersection be joined with both centres, the figure is a rhombus.

8. Construct a rhombus having one of its diagonals equal to a given line.

9. Keeping (6) before you, show that there is an infinite number of solutions to (8), as also to (2).

10. Show how to make a rhombus having each of its sides equal to a given straight line.

11. Given a line, length one inch, construct a triangle whose sides are 3, 4, 5 inches respectively.

You thus solve i. 22 for the case when the sides are commensurate. But you must on no account point out at this stage that the angle of this triangle is right, or your pupils will assume an angle to be right when it looks so.

12. Lastly, if you ask them to draw a triangle whose sides are 1, 3, and 5 inches, and if you point out that the problem is impossible, and why, you pave the way for Euclid i. 20: and you will do yourself service in another direction, for most of your pupils will not see that the problem is impossible until they draw their circles; and you can remind them of this when they tell you, as they probably will when you come to i. 20, that the theorem is obvious, and no proof necessary.

Prop. ii.

I must pass over the Second and Third Propositions without comment, save that I think it is a mistake to omit the second, as Nixon[1] does. There is no better training than the construction of the figure in the varying cases here. There are eight cases, and to these may most usefully be added the cases when the given point is:—

1st. Within the given line.

2nd. At the middle point of the given line.

3rd. On the given line produced.

Prop. iv.

With the Fourth Proposition comes your first real difficulty. You can surmount this easily and satisfactorily if, instead of drawing a figure on the blackboard, you pin up to it two paper triangles, which you can take, when occasion requires, and place one on the top of the other. You must not allow the triangles to be equilateral, nor, generally speaking, to be right-angled—just as when a parallelogram is in question you should strictly discountenance a rhombus or a rectangle, while you must rule a parallelogram out of court when your question refers to a quadrilateral—otherwise you will have false inferences made.

Prop. v.

Euclid's proof of the Fifth and Sixth Propositions should be left until after the Twenty-sixth, by which time the pupils will have got accustomed to the equality of triangles in various positions. Meanwhile, but only as a temporary expedient, the Fifth Proposition must be proved by super-position. Again you have a paper diagram, but this time it is double. You reveal that the triangle *ABC* has left its mark behind it, as it were, to show its size, and has changed its place. You then turn it over, and it would be as well to have it of a different colour at the back; you call your reversed triangle *abc*, and you proceed to put it back again and go through the argument of i. 4 with it. You must

[1] *Euclid Revised*, Clarendon Press.

be careful, however, to show that *b* and *c* correspond to *C* and *B* respectively. Moreover you ought not merely to say that the result you desire follows by i. 4. Go through the proof of i. 4 with your two triangles once more, just as if i. 4 were not in existence. So again for i. 6.

Prop. vii.

Proposition vii. should be read. I cannot see any force in the objection to impossible figures. The pupil will often draw such figures without meaning to do so, and it seems to be of the utmost importance that he should learn to argue out all the consequences of a figure and thus to test for himself whether the figure he has drawn is or is not a possible one.

Notes on Book i.

In Props. ix., x., xi. and xii., encourage above everything accurate figures. Show also other methods of attaining the same ends, such as those adopted by carpenters and in books on Geometrical Drawing. Explain why these serve their purpose better than Euclid's would. But let Euclid be the letter of your law throughout.

Prop. xiii. will present no difficulty if the flat-angle be introduced; otherwise there are few propositions to which the schoolboy so strenuously objects.

After Prop. xvii. you will introduce the old Twelfth Axiom and a short disquisition on the meaning of parallels.

After Prop. xxvi. you will summarise the cases in which Euclid has proved two triangles to be equal, and add the missing case which Euclid appears to notice for the first time in vi., 7. You can always lead your class to discover this missing case, and most of them will discover its ambiguity also.

After Propositions xxxv., xxxvi., and xlvii., it is very useful, indeed almost essential, to show that the figures concerned may be divided into congruent figures, *i.e.*, figures which will fit together. This should be done by dissected cardboard models.

Book ii.

In the Second Book, the abbreviation AB^2 for the square on AB ought not to be allowed until the Eighth Proposition is passed. After this (except in xi.), Euclid never actually draws the square represented by AB^2, and there is less harm in the abbreviation. I do not think it wise to direct attention to the Algebraical meaning of the propositions until the first eight are mastered; and the use of the sign *minus* is always dangerous for a weak pupil. The almost universal ostracism of the Eighth Proposition appears causeless. The proof by congruency of these eight propositions should always be exhibited by dissected cardboard models.

Proportion: De Morgan.

I must omit all the many questions raised by the Third and Fourth Books in order that I may find space for a word or two on Proportion before I conclude. Our first task is to render the definition comprehensible. It is not hard to make a class understand the immense logical difficulty involved in the ratio of incommensurable quantities. It was this, and the undeveloped state of Arithmetic, the absence of any good notation for vulgar fractions, which placed Euclid in the dilemma from which he escaped by his brilliant definition of the equality of ratios, one of the most original and ingenious devices in the whole range of Mathematics. The definition however is difficult, and we shall do well to bring forward De Morgan's masterly presentation of it. But De Morgan wishes us to imagine columns and colonnades and railings, and, as these things are not met with in an ordinary schoolroom, I will alter the phraseology a little, and present the matter thus: We have our pupils round the blackboard, and draw a ground plan of the schoolroom for them, indicating in the plan the boards of the flooring and the positions of the desks. Then we note that Euclid's idea of the proportionality between width of board, width of desk, width of board in plan, width of desk in plan, is that if we fix our eye on, say, the eleventh board and the fifth desk, we

shall find the desk beyond the board in the plan if we find it beyond in the schoolroom, at the same place in the plan if it is at the same place in the schoolroom, behind if it is behind. This sounds complicated, but is really simplicity itself. I happen to have had the opportunity of trying the illustration recently with a class, and was much interested to note how a boy whom I always regard as the barometer of the class indicated at once "Set Fair," and subsequently gave me an intelligible account of this difficult subject.

CHAPTER IX.

PHYSICAL SCIENCE.

Physical Science as a subject of Instruction. Its place in School work.

THE necessity for an organized system of Instruction is a settled question. Experience has shown that systematic education is a most important factor in the causes which lead to individual and national development. Although any discussion of this question lies outside the scope of this chapter, it is necessary for our purpose to emphasize the fact that, in the general case, the ultimate object of education is to prepare men and women to carry on the work of their lives with the greatest possible advantage to themselves and the community.

Viewed in this light, Physical Science has an indisputable claim on teachers as one of the most important subjects of instruction. In no other subject is mental training so naturally the outcome of a careful study of science for its own sake. The facts of a science have to be obtained by careful observation and experiment; they have to be sought, one after the other, for definite reasons and by definite methods; they ultimately lead, step by step, to the broad generalisations which constitute the laws of the science, and every step demands the full exercise of all the mental faculties. Mental Discipline of the highest order is the result, but not the object, of work of this kind. Moreover,

the knowledge acquired by a course of study in Physical Science is in many cases of the greatest importance for the practical applications of Science to the industries and commerce of the world, and it is by no means unimportant for the training of a student that he should constantly have to consider the practical bearings of acquired theoretical knowledge. Further, the experimental work inseparable from such a course exacts a rational and systematic training of both hand and eye, the value of which can hardly be over-estimated.

Although Physical Science is thus pre-eminently a subject for the student, it is a somewhat difficult question to decide how far it should be taken up in schools. My own experience goes to show that Science can be seriously and successfully taught only to properly prepared scholars, and that the teaching of Science properly so called should be confined to the upper forms of schools. The preparatory teaching in the lower forms would, indeed, necessarily involve a good deal of what usually passes for Science, but I feel more and more convinced that the general education of a scholar who intends to take up Science cannot be too liberal, and that no loss of time whatever is involved in delaying the teaching of Science until a good foundation of general education has been laid. It is perhaps too much to expect the realization of knowledge to keep pace with its acquisition, and in many cases it is sufficient for the scholar to realize the full import of his knowledge long after he has acquired it, but in Science the student must have a clear, though necessarily incomplete, conception of the import of his work as he acquires it, and with young and untrained minds this is impossible.

Another point, which at least shows the expediency of confining Science teaching to the upper classes in a school, is the difficulty of arranging for satisfactory laboratory work

when the number of scholars to be taught is very large. Under exceptionally favourable circumstances it is possible to cope with this difficulty, but in most cases the difficulty is a very serious one. Another practical difficulty pointing in the same direction is that, if Science is taught in all the classes, and anything like the necessary time given to it, the arrangement of a satisfactory time-table is almost an impossibility.

Preparatory Instruction.

It seems therefore desirable to limit the teaching of Physical Science in schools to suitable preparatory instruction in the lower classes, and careful thorough teaching of one, or at most two, fundamental subjects in the upper classes.

In addition to the usual routine of school work, the Preparatory work in the lower forms should include:—

(*a*) An easy course of object lessons in general Elementary Science, which may train the scholars in the habit of careful observation, classification, and generalization. This course should be exceedingly simple and clear; it should really be a continuation and extension of Kindergarten work.

(*b*) Drawing, Manual Work, and Simple Measurements. The manual work—preferably wood-work—should be dealt with as an application of drawing. All the work should be done from drawings carefully prepared to scale, thus affording very valuable training in accuracy of drawing, manual work, and measurements.

(*c*) A very careful training in the ground-work of Mathematics, and the elements of Mechanics. The work in Mechanics should include only the simplest fundamental facts and principles of Kinetics and Statics.

Of the three stages here indicated, (*a*) and (*b*) are the simplest, and might very well be taught simultaneously in the lower forms. Stage (*b*) must necessarily be associated with a good deal of exercise in simple measurements, and it

would, in most cases, be desirable to include in this stage instruction in simple practical geometry, mensuration, and direct measurements of area, volume and mass. Stage (*c*) is of a more advanced nature, *and need not necessarily precede the simpler elementary instruction in any branch of Physics or Chemistry;* but if the scholars are to take up work which requires a clear conception of the fundamental units of length, mass and time, and of the simpler derived units, the work of this stage becomes of the highest importance. The mechanics taught in this stage should be simple but fundamental, and the mechanical principles dealt with should be illustrated, wherever possible, by carefully arranged experiments[1].

Introductory Course to more advanced work in Physics or Chemistry: Theoretical Mechanics and exact Physical Measurement.

A preparatory course of this kind leads naturally and easily to a more detailed experimental study of Physical Science. The first stage of this study should undoubtedly be a careful course in Theoretical Mechanics, combined with a practical course of exact measurements, and with simple experimental work in Hydrostatics and Pneumatics.

The course on measurements should be of a more exact and detailed character than that associated with stage (*b*) above. It might commence with measurements of length involving the use of the vernier, callipers, screw gauge, and other instruments of exact measurement. Measurement of area and volume should be followed by the adjustment and use of the balance in the estimation of mass. Determinations of density and specific gravity should then be made, the

[1] The course of measurements indicated in Sections 1 to 5 (Elementary Physics) of the Syllabus issued by the Science Committee of the Head-masters' Association might well be taken with stage (*b*), and some parts of Sections 11 to 18 might, with advantage, be associated with the mechanics of stage (*c*).

hydrostatic method of measuring volume practised, and a number of carefully selected experiments attempted, with a view to the verification of the more important mechanical principles. The theory and use of hydrometers, the pressure due to liquid columns and the verification of Boyle's law, all supply suitable experimental work, and the determination, by means of the pendulum, of the acceleration due to gravity may serve to introduce some of the more accurate methods of measuring time. Wherever possible, the scholars should be taught how to exhibit their results graphically. A number of experiments specially arranged to illustrate the application and advantages of 'curves' would also be of great value.

The initial course here sketched out is a practical course, involving a number of experiments, in which it is possible to obtain, with simple inexpensive apparatus, fairly accurate results. In many experiments it is difficult, even with the greatest care, to obtain anything like an accurate result; and it is in every way desirable to avoid, in a first course, experiments which may tend to discourage the student and give him a wrong estimate of the possibilities of experimental work.

Instruction in Practical work.

A practical course of this kind should be conducted by means of demonstration lectures, in which the methods of work are explained and illustrated by the teacher, and should be combined with individual Laboratory work on the part of the scholars. In the Laboratory the scholars should, as far as possible, work separately, and all work should be carefully and thoroughly done; if careless and slovenly, it is worse than useless. Each scholar should keep a Laboratory Note-book, in which the details and results of his practical work should be regularly written up, and as regularly revised and corrected by the teacher.

After a practical course of this kind, the scholar will be

prepared to take up the study of Physics or Chemistry or both. It is not desirable here to enter into any detail as to the scope of the courses in these subjects, but something must be said on the general methods of instruction.

General methods of Instruction.

A great deal has been written in favour of the Research attitude on the part of the learner. But, despite the force of some of the arguments adduced, it may be doubted whether this attitude is the proper one for a beginner. At the commencement of a science course the teaching cannot be too simple, and it must be very clear and definite. Each step taken should logically follow from the work already done, and every experiment should be undertaken with a definite object, which should be fully understood and appreciated by the class. In working out a course of this kind, the *teacher* might, with advantage, follow an imaginary research path into the subject, but the scholars may not become conscious of this, and it is quite unnecessary that they should. If scholars are taught to observe the progress of an experiment in a vague sort of way, and asked to deduce results from their observations, without being told definitely what to look for and how to look for it, the only result of the work is waste of time. In fact, until the scholars have acquired a little knowledge of the subject, it is useless to expect them to reason for themselves in the way necessary to follow out even the simplest research. Reasoning of this kind involves a knowledge of the facts and principles of the subject, and a beginner's time is best employed in acquiring this knowledge under the guidance of a competent teacher.

At this stage, too, it is possible now-a-days to have too much experimenting and too little theory. Experimental work is of no value whatever unless the theoretical knowledge of the scholar is full enough to enable him to understand

clearly the object and the details of the experiment. The scholars should be carefully prepared for every experiment shown them — they should know why the experiment is undertaken and what they are to look for, and they should understand every detail of the apparatus. In the same way the Laboratory work of the individual scholars should be associated with lessons on the theory of the work, and these lessons should be in advance of the practical work. There is probably no class of teaching which is more valueless than that in which theory is neglected for the sake of experiment—the Laboratory work degenerates into mere mechanical routine, and the student acquires no real knowledge of the subject.

There seems to be a growing tendency on the part of incompetent teachers to think that if their Science teaching includes 'experiments' and Laboratory work, it is therefore all that it should be. They regard experiment, combined with the 'inductive method,' as the essence of good teaching. A class commences Chemistry by seeing Hydrogen prepared in the usual way, and is thereupon invited to 'observe,' make notes and 'draw inferences'—possibly also, in the person of a single one of its members, to repeat the experiment. All are then supposed to be learning Chemistry by the most approved methods, whereas probably not one scholar in the class has any real conception of what is going on.

When, however, a scholar has made some progress with a Science, and possesses some knowledge to work with, it is in every way desirable to encourage him to experiment for himself, and to think for himself. Part of his Laboratory work should now consist of very simple researches after facts. For example, as soon as he thoroughly understands density determination, he might experiment to see how far hammering a piece of lead alters its density, how the density of an alloy of known composition is related to the

densities of its constituents, how the density of a solution depends upon its concentration. In all work of this kind, it is above all things essential that the methods employed and the results obtained should be intelligible to the student in the light of his previous knowledge. He should, as far as possible, adopt his own method of attacking the question set before him by the teacher. By work of this kind, the scholar will not only be greatly interested in the subject, but obtain valuable training in methods of research. If, however, the scholar adopts too early, and with insufficient knowledge, the role of discoverer, he can neither fully realize the problem to be attacked, nor invent for himself the method of attack, nor have any real appreciation of the result obtained.

It will be seen that the method of teaching here advocated involves :—

1. The teaching of the Theory of the subject.
2. Demonstrations.
3. Individual Laboratory Work.

Instruction in Theoretical work.

The Demonstrations and Laboratory Work go hand in hand, as indicated above, and both are based on the theoretical knowledge possessed by the scholar. Enough has perhaps been said on the conduct of experimental work, and it may be desirable to deal a little more fully with the theoretical teaching.

So long as the teacher is competent and knows his subject, he may safely adopt his own method of teaching; but my own experience leads me to think that simple lectures, illustrated by a few really essential experiments and diagrams, give the best results. For school purposes, the scholars' notes, revised by the teacher, supply the most satisfactory of text-books. The illustrative experiments should be simple and well chosen, and—most important of all for school work—the lectures should not be continuous discourses perfunctorily

followed and more or less fragmentarily transcribed, but oral lessons, in which the teacher takes care that every word goes home to each scholar, constant attention being secured by frequent questioning, by the working of examples and reproduction of sketches. The essential parts of the lesson should be dictated as notes, and the scholars allowed to amplify their notes as much as they like when writing them up after the lesson. This writing up of lectures from the rough notes taken during the lesson is a very important part of the process of instruction, and supplies a very beneficial kind of home work. These notes should in all cases be carefully and regularly revised by the teacher; otherwise they are liable to be neglected, and become useless for revision work. It will be noticed that very little importance is here attached to elaborate lecture-experiments. Every lesson should, of course, be fully illustrated with diagrams and experiments; but the large number of show experiments which are often dragged into lectures have little or no educative value, and serve only to ornament the lecture and distract the attention of the scholars from the work of the lesson. The greater part of the real experimental work of the scholars must be done in the laboratory, and for that reason there should be, as already suggested, a close connection between theoretical teaching and laboratory work.

Use of Text-books.

Although it is not desirable for young students to work from a text-book, it must be remembered that they will ultimately have to do the bulk of their reading from text-books, and it therefore becomes necessary to teach them how to study for themselves. For this purpose a special class should be arranged, in which a good elementary text-book in Chemistry or Physics is carefully worked through under the guidance of the teacher. The object of the teaching should be to guide the scholars in the use of the book and in the methods of

private reading. School-boys will learn by heart anything that is definitely set them, but they are slow and unwilling to acquire the habit of *reading* for themselves; and must be carefully taught how to extract information from the pages of a Text-book on Science.

It will be seen that one of the aims of the scheme of work here outlined is to secure continuity in the work of the scholar. But, in order to attain this continuity to its fullest extent, something more is necessary than logical sequence of matter and method, and a close association between theoretical and experimental work. There must be continuity in the teaching—the same teacher should teach the same subject in all the classes, and should teach both theoretical and practical work. The system of form masters, who take their respective forms in all form work, is perhaps the only practicable one in the lower forms; but for, say, the two upper forms, a departmental system, in which each master teaches his own subject or subjects, is undoubtedly the best. In Science teaching, at all events, this is the only satisfactory method.

Continuity of Instruction.

Teaching of this kind lays a very heavy responsibility upon the teacher, and imposes on him a very great deal of work. Lessons and experiments have to be prepared, laboratory work has to be arranged and superintended, and note-books have to be revised and corrected.

Work and Responsibility of Teachers.

All this involves a much greater amount of labour than can well be appreciated by the uninitiated; and, if the classes are too large, the work becomes unmanageable. In all schools in which Physical Science is seriously taught, there should be at least one special teacher for the work, and he should have a good laboratory and the assistance of a lecture attendant, whose duty should be to keep the laboratory in order, and to help in the preparation of lecture experiments and in the

arrangement and conduct of laboratory work. These arrangements may seem to verge on the luxurious, but it is certain that, for good orderly experimental work, a laboratory attendant is as essential as a teacher, and any attempt to combine the two must deservedly fail.

Training of the teacher.

The qualifications of the teacher must obviously constitute a most important factor in the successful carrying out of the method of instruction here suggested. It may not indeed be primarily essential that the school teacher of science should have a highly specialized knowledge of his subject. What is of vital importance, however, is that he should not only possess those general qualifications which are indispensable in the case of all teachers alike, but have undergone, in addition, a systematic course of training both in science generally and, to some degree at least, in the special branch or branches which he elects to teach. This course of training, too, should be associated with, and to some extent preceded by, a sound general education of a liberal type. Superfluous though it may seem to emphasise points of such obvious importance, it is nevertheless unfortunately true that, in many secondary schools, the teaching of science is entrusted to men who, though possessing approved qualifications in some other department of study, have no special knowledge of science. Other teachers, again, who lay claim to such knowledge, are deficient in general education, or entirely lack the systematic training essential to the efficient performance of their work.

The Committee on Science Teaching appointed by the Incorporated Association of Headmasters, working on the lines suggested by Prof. Armstrong, have issued an excellent Syllabus[1]

[1] To be obtained from Whittaker and Co., White Hart Street, Paternoster Square. Price 3*d*.

of practical work in Elementary Physics and Chemistry. In the preparation of the Syllabus "the Committee have been actuated by a wish to indicate both to teacher and to examiner what experiments can suitably be performed by beginners." The Courses indicated in the Syllabus are intended for scholars commencing the study of Science, and may be associated, as indicated in a foot-note, with stages (*b*) and (*c*) of the Preparatory Course referred to above.

Syllabus suggested by Committee of Headmasters' Association.

The replies given some years ago to enquiries made by the Committee of the British Association on the teaching of Physical Science suggest that even now the position given to Science in the curricula of many schools is not a satisfactory one.

Present position of Science in curricula of Secondary Schools.

The time given to Science teaching is in many cases far too little, and the only scholars who are allowed to take up Science are too often those who, from want of ability or aptitude, are not likely to do well in Classics or Mathematics. The increasing number and value of university scholarships in Science, and the growing supply of teachers who have graduated in Science must ultimately lead to reform in this direction. Science will continue to make increasing demands on the time and work of the teacher, and on the equipment and staff of the schools. We are, even now, beginning to realize that scholars in the upper forms of our secondary schools cannot possibly give the necessary time to each of the many subjects that have to be taught, and we are face to face with the difficulties of specialization and over-work. There can be but little doubt that, in spite of the dangers of premature specialization, the solution of the difficulty must involve exclusion of the subjects least necessary for any particular course of study. In these circumstances the duty of the science teacher is to take care that science is not only

properly taught under the best possible conditions, but that it is also associated with that amount of literary and mathematical instruction which is most essential to its fullest development.

In the case of Physical Science the essential basis of study is a knowledge of mathematics and mechanics, and a boy had far better spend his time in the study of these subjects than in acquiring a smattering of physics and chemistry at the expense of his mathematics. In the case of scholars who intend to continue their studies at a University or Technical College, it is of far more importance, in the department of Physical Science, that they should be properly prepared to take up their special subject from the beginning than that they should possess a general knowledge of that subject based on insufficient and inaccurate preparatory work.

Hence, in deciding on a curriculum, it is essential, even at the expense of more specific scientific instruction, to make complete arrangements for teaching the fundamental preparatory subjects. The subjects that may be classified as preparatory will depend upon the scope and plan of the curriculum, and must be settled by every teacher for himself.

Influence of Examinations.

The influence of examinations on teaching is an important and difficult question, the solution of which is indicated by the educational commonplace that it is their abuse rather than their use which has led to most of the evils ascribed to the examination system. When examination results are used as a means of advertising a school, and as a test of the work of the school staff, the inevitable result must be a lowering of the teacher's standard of work. The object of teaching will be to obtain good examination results, and the scholars will naturally think that the one object of learning is to pass examinations. In their proper place, however, examinations by competent examiners are of great help to a teacher. In many cases they

give definiteness to a year's work, and they supply a wholesome stimulus to the general work of the school. Detail-drudgery is more thoroughly learnt than it otherwise would be, and both scholars and teachers are able to test at least the effectiveness, if not the full value, of their work.

To serve a good purpose, however, the examinations must be good and thorough. In all subjects, but especially in Science, the value of an examination depends upon the standing and experience of the examiners. With well qualified examiners, the value of an examination, as a test of both scholar's and teacher's work, is often much greater than it appears to be on paper; and although such examiners can seldom control the Syllabus of examination, there is always, in their case, some guarantee of a sensible interpretation of the Syllabus, and of an accurate estimate of the work sent in. The examination of practical laboratory work in Schools is a difficulty which can only be met by personal inspection or examination on the part of the examiner, and here again it is in the highest degree essential for the examiner to be a specialist in the department in which he examines. Hence, if teachers are free to concern themselves exclusively with those examinations which are adapted to the work of the school, and are conducted by really competent men, they will no doubt find the examination system an important factor in the advancement of their work. In Science, the influence of examiners would perhaps be greater if they were allowed to remodel many of the Syllabuses prescribed for public examinations. A fixity of Syllabus requirements is, however, an essential of examination work, and their gradual adaptation to existing educational conditions is perhaps more satisfactory than any alternative involving sudden and far-reaching modifications.

CHAPTER X.

CHEMISTRY.

'The development of habits is necessary for the individual, and hence for the race, but it stops development along new lines.' (Prof. G. F. FITZGERALD, F.R.S., Helmholtz Memorial Lecture, *Chem. Soc. Journ.*, 1896.)

PROBABLY no other subject can be taught in school with greater advantage—if it be properly taught; but probably no subject is more difficult to teach properly than is chemistry. Hitherto, however, it has suffered greatly from the failure of teachers generally—especially heads of schools—to appreciate its value as an educational instrument, in consequence of their own want of familiarity with the subject as well as our failure to make its merits known; moreover, and not least, because entirely contorted views of its aims and objects have been gradually introduced, chiefly through the misdirected efforts of examining bodies, who have done irreparable injury by fostering a mechanical system—itself an outgrowth, a necessary outgrowth—of uncontrolled and narrow specialism: for if the proceedings of examining boards in general be studied, it will be found, I believe, that with the rarest exceptions they consist of individuals acting individually, meeting perhaps to consider a class-list together, but seldom seriously acting collectively on any question of educational import.

At the outset, I desire to affirm that the conventional chemistry of school primers and the various examining bodies is worthless—nay worse, positively detrimental from any sound educational point of view; and for this chemists themselves must be held to be mainly responsible.

Conventional chemistry worthless. Evils of examinations.

What can be the value of a subject which it is possible to 'get up' in the course of a few weeks or even months? That hundreds and thousands of scholars should be annually presented for examinations, and should be allowed to pass and obtain certificates after such preparation, is in itself proof of the lowness of the moral standard we are willing to accept in affairs educational—owing to the prevalence of the commercial spirit and our method of advertising 'passes' as a means of advertising schools. The discovery has, in fact, been made that examinations not only afford remunerative occupation, but also that, if carried out on a sufficiently large scale, they can be made remunerative—indeed we may class examining among the new industries discovered in modern times. Like some other modern industries—for example, the conversion of china clay into calico, the weighting of silk, the production of spirits for export to Africa—it brings considerable advantage to those concerned in carrying it out, although not always to those on whose behalf it is instituted.

However valuable examinations may be as a means of 'putting on the screw' on both teachers and taught, it is impossible to overrate the injury done under our present system by unduly 'forcing the pace' and neglecting the apparently unpromising material on behalf of those whose work is more likely to afford 'results.' The undue encouragement given to 'literary' methods, owing to the extreme difficulty of properly examining practically, is one of the greatest evils the system entails; the interference with

freedom of action in schools, and the consequent check on the development of methods of training, is another; and further confusion is introduced in consequence of an entire absence of coordination in the requirements of the different examining bodies. It is necessary to raise all these questions, because teachers for the most part consider themselves tied hand and foot by the requirements of examiners.

To make the teaching of chemistry in schools of any value whatsoever, two things are necessary: the requirements of examiners must be such as to encourage rational teaching—indeed, to make it essential; and the character of the examinations must be such as to enforce a real standard. Instead of being allowed to nibble at a few questions and to pass if they gain the requisite minimum number of marks, students must be required to give proof of some useful knowledge of the subject, and especially of training. All who have any experience as examiners know that, tested by any such standard, the percentage of passes would not reach two figures.

Neglect to encourage individuality.

When we reflect that no nation prides itself more than ours on its individualism, and probably with reason, it is most remarkable that our education should be carried out in so mechanical a manner, without reference to the necessity of cultivating and expanding what are generally recognised to be innate tendencies.

We are proud of our great public schools and talk of our victories having been won on the playing fields of Eton—yet all who seriously study the problem must recognise that our public school system is good in consequence of what is done out of school rather than in consequence of what is done in school; that the social influences which are brought to bear in them, and the discipline of the playing-fields, are the real elements of importance in the system: the school-work being of the same kind as, and in no way

superior to, that done in numbers of ordinary schools of no special repute.

Why then do we not seek to apply the methods which afford such good results out of school to the studies in school? Why do we not devote more attention in school to the development of methods of forming character? Why should the whole 'civilised' world be engaged in forcing its children into one mould—in subjecting them to the tyranny of perpetual lesson-learning—in seeking to deprive them of their individuality and of the power of self-helpfulness?

Necessity of considering method.

It is time indeed that we paid chief attention to the discussion of methods of teaching and to the selection and training of teachers; when some advance in this direction is made, it will be possible to consider how examinations shall be conducted. At present we live in an ever vicious circle of badly examining those who have been badly taught—because both examiners and teachers have a false standard before them. Examiners' reports, when honestly given by competent men, are in consequence almost always tales of woe.

New elements of disturbance are now being introduced, as a dissatisfied public, unable to diagnose the true nature of the disease, is beginning to favour the teaching of technical subjects in schools. Examinations for scholarships are being held all over the country under the auspices of County Councils, and will—unless carefully controlled—not only interfere with the regular course of education, but have the effect of selecting scholars who may be good lesson-learners, but not necessarily the most capable in other respects.

Objects to be attained in schools.

Before any improvement in our school system can take place, we must arrive at some clearer understanding as to the objects to be attained in schools; it must be recognised that we do not

so much require to impart knowledge as to teach knowingness. We must then consider what constitutes knowingness—what are the directions in which the human mind needs cultivation in order to best fit it to perform the work of life.

And this is especially necessary at the present time when —owing to the imperfect understanding of the issues involved, of the methods available, of what might and should be done if only it were possible to really grasp the situation in which we are placed—the desire is being expressed to revert to literary methods.

Reading, writing and arithmetic—giving to these terms their broadest meaning—are universally recognised to be three necessary branches of education, but unfortunately they are almost invariably regarded as sufficient. Exception is made in the comparatively limited number of cases of those taking up careers in which the knowledge of some branch of natural science is necessary. 'Science,' in fact, is almost always taught in schools in response to outside pressure, not because it is believed that it affords an important means of training faculties which otherwise remain uncultivated. But this cannot be allowed much longer. We are, in fact, forced to recognise that if we are to fulfil human responsibilities in any satisfactory manner in the future, a fourth branch of study *must be included* in the general curriculum: it cannot be defined as science, for all exact knowledge is science, but it may be termed, for want of a shorter expression, the study of *Scientific method treated experimentally*—and with direct reference to practical needs.

What we all require is to be able to utilise the opportunities we have—to be able, not merely to read, but in every way to mark, learn and inwardly digest the daily lessons of life, whatever their nature. It is essential that every possible effort be made to develop all the elements constituting character.

But so long as we merely teach children what is, and do not equip them to be—in however humble a manner—discoverers in their turn, we manifestly fail to educate them to the best advantage. Assume that it is sufficient for technical purposes to train, let us say, the bank clerk to write a good hand, to add up long rows of figures correctly, to be honest and to attend to his technical duties—yet, to properly fulfil his duties as a citizen and as a potential or actual parent, he must have received a far broader and more liberal training than will merely enable him to meet the technical requirements of his position. It is this disregard of the human side which is so fatal a flaw in the modern technical education movement; but after all it is but the swing of the pendulum to the opposite side, technical requirements having been too long overlooked in our schools.

That we must steer a middle course is only too clear to all unprejudiced students of such questions. Our present school system neither confers technical qualifications nor lays a proper foundation for the subsequent successful study of technical subjects: those who are subsequently successful, with rare exceptions, succeed in spite of, and not in consequence of, their school studies. In the future we must before all things seek to form the characters of our scholars, and to send them away from school anxious to continue their studies—not sick to death of them—and trained to work properly. The formula of modern education must be—reading, writing, arithmetic *and* scientific method, so that all human faculties may be exercised and developed.

Teachers in technical schools and colleges can do nothing with boys and girls from school so long as they are mechanically taught. My own life, I know, has been a burden to me of late years in consequence of the bitter disappointment I have year after year experienced in dealing with junior students—who, for the most part, have not had

the faintest desire to learn, let alone any power of helping themselves. Brought up on spoon-food at school; incapable of thinking, because they have never been called on to think in any general manner; without the slightest power of observing; absolutely destitute of experimental skill: in all but exceptional cases they have been incapable of availing themselves of the opportunities one was only too anxious to give them and even to force upon them; and their failure has in the great majority of instances been due to faulty training, not to want of intelligence.

What is the remedy for this state of affairs? No slight alteration in our school system will suffice; there must be a radical change in method. We must recognise that the present system is a patchwork, mainly constructed of experiences gained generations ago, and we must awake to the fact that we have no longer to minister to the needs of the mere contemplative student, but to those of the practical every-day worker.

We have especially to bear in mind—as M. Berthelot, the eminent French chemist, has recently insisted—the difference between the modern era of applied science, extending over the last three-quarters of a century, and the whole development of the human race during the last 6000 years: a difference so marked (he points out) that a new man is being created on a new earth, and the entire social organisation is being transformed amid conditions for the comprehension of which the past offers no suggestive precedents or data.

Some preparation is required to meet this change.

Nature of the change to be made:—abolition of the learning of lessons by rote.

Mere lesson-learning must be abandoned. As Prof. Meiklejohn has said (*Proc. Int. Conf. on Education*, 1884, IV. 108), 'it is useless to force this or that idea, this or that piece of knowledge, on the minds of our pupils; all we do must be tried by the ultimate test—the test

of life. That test is contained in the plain questions:—Are the pursuits and the exercises followed and employed in my school likely to be carried on by my pupils after they have bid me good-bye? Will the habits I have given them remain? Are the ideas I have given them seeds that will grow and produce fruit for them in their adult life? Have I, above all, given them "the expansive joy of soul over work" that is the source of all fine art?' All must agree with him that 'It would be good work, and work enough, for a professor of education if he could show us, in each subject, how the *Didactic* (*telling* instead of *teaching*) could be kept out of the teaching of it, and how learning might be made a vigorous excursion, with fresh woods and pastures new for the dawn of every morning.'

The main object of all teaching in schools must be to train young people to be generally observant, thoughtful, exact and self-helpful—to make them desirous of extending their knowledge by applying that they already possess—to train them to pass from the known to the unknown; 'to substitute' in short, as Lord Reay has said, 'rational for mechanical methods of teaching, in order to rouse the inquisitive tendencies which in many cases now are deadened; to make the school, not the early grave of individuality, but an attractive spot.....'

Essential to introduce the heuristic method.

In seeking to impart a knowledge of scientific method, it is to be remembered that children are from the outset born enquirers, and that all we have to do is to develop and practically train faculties which all possess to some extent. True Kindergarten teaching proceeds on these lines, but at school set lessons too often entirely usurp the place of exercises calculated to develop the individuality of the pupil.

Again, to quote Prof. Meiklejohn, 'the permanent and universal condition of all method is that it be *heuristic*. Man is by nature a seeking, inquiring, hunting animal; and the

passion for hunting is the strongest passion in him.' When this doctrine is grasped, when this spirit actuates the work, but not before, the teaching in schools will be satisfactory.

Chemistry alone insufficient; a general experimental course required.

It was necessary, before discussing the teaching of chemistry in schools, thus to consider generally the object to be attained, in order that the point of view from which the subject shall be taught and the manner in which it shall be taught may be properly taken into account. Another necessary preliminary consideration is that chemistry alone cannot be taught with advantage in schools—a general preparation must be secured by means of a course in which chemistry occupies a prominent place, but does not exclusively occupy attention.

This question is one of the very greatest importance from an educational point of view, and merits before all others the most serious attention of examining boards and scholastic legislators. To permit of subjects such as botany, chemistry and physics as alternative subjects, whilst making mechanics an obligatory subject, is probably entirely subversive of the true interests of education—such action arises from the mistaken notion that the discipline afforded by each of the subjects is equivalent, from the complete disregard of practical human requirements, and from the worship of a schoolmaster's standard of an altogether antique type. It is to be hoped that it will ere long be possible to provide a single mixed subject comprising the necessary minimum of each branch, and in which no part is treated technically.

In the case of an examination which is preliminary to others, the requirements are necessarily different from ordinary school requirements, which again may vary with circumstances — according to the class and age of the scholars and local needs: but in all cases the great object in view should be to satisfy human requirements primarily and to consider local requirements only in the second instance.

As regards the extent to which chemistry and physics should be taught, I believe that these subjects, when discussed from a proper point of view, will not give rise to any great difference of opinion—that there will not be much difficulty in agreeing as to an irreducible minimum; but in the case of mechanics and botany there will, I fear, be greater difficulty. In the case of these latter, the question of the needs of the two sexes comes into consideration: frankly, I am one of those who cannot admit that boys and girls may and should be treated alike; and in the case of girls, as the teaching of mechanics does not offer any special educational opportunities subservient to their requirements, I should not be inclined to press the subject on their attention except to a very limited extent. In the case of botany, on the other hand, the requirements in agricultural districts are totally different from those in towns: in the former it is all-important that children—boys especially—should be taught to study plants *in Nature:* to watch their growth and their different habits; but in towns the study of living plants—not of plant-forms—is all-important as affording the opportunity of studying life, and as constituting an introduction to physiology. It is impossible for children to make experiments on the growth of animals; it is easy to make experiments on the growth of plants. To women especially a knowledge of the fundamental principles of physiology is of primary importance, and instruction in botany—and particularly in the department of vegetable physiology—is generally of more value to girls than to boys. From the point of view here advocated, botany would come late in the course, as some knowledge of chemical principles is necessary for the comprehension of vital changes[1].

[1] For a most valuable series of suggestions for such work, drafted by Prof. Marshall Ward, F.R.S., see the Major Scholarships Regulations and

Obviously there is a great field for research open to teachers who will be at the pains to endeavour to devise carefully graded courses of instruction suited to the requirements of boys and girls of different ages and classes and in different environments. The work done by the Committees appointed by the British Association and by the Incorporated Association of Headmasters may be referred to in illustration of what is required; but it should at once be pointed out that it will be necessary in the future, in order to aid teachers, to elaborate schemes somewhat minutely, so that those without special experience may derive assistance.

Mode of proceeding at the outset:—lessons in physical measurement.

Although much experience must be gained ere it is determined what are the best modes of proceeding—for, except in principle, there can be no one mode—it can scarcely be doubted that children should from the outset be led to take note, as far as possible, of what *is* and of what *is going on* in the world about them, whilst at the same time they are being prepared for the scientific study of materials and changes.

Such preparation will involve instruction in the methods of physical measurement, and such instruction should in future form part of the instruction in elementary mathematics—a subject which, it is to be hoped, will ere long be largely taught by practical methods and with reference to ordinary daily needs.

The measurement of lengths, of areas and of volumes must be thoroughly mastered, and the measurement of mass —weighing—must be taught at the earliest possible moment, every opportunity being subsequently taken of making observations with the aid of the balance.

Examinations Syllabus, April 1895, published for the I. A. H. M. by the Educational Supply Association, 42, Holborn Viaduct, E.C.

The use of the balance as an instrument of moral culture has yet to be appreciated by teachers. The exercise of weighing exactly with a well constructed balance is, I am satisfied, of all others the most important to introduce into schools at a very early period as a means of forming character. But to this end it is necessary to make use of a balance which will command respect, and yet is not so delicate that it cannot withstand ordinary fair usage.

Before commencing any chemical experiments, it is desirable also that familiarity should be acquired with the use of the thermometer in measuring temperature and quantity of heat.

Nature of the instruction to be given in chemistry.

To discuss the teaching of chemistry properly, it is necessary first to enquire:—What is chemistry? Why should boys and girls at school be taught chemistry, and how should they be taught?

Among school-boys chemistry commonly goes under the name of 'stinks'—yet a rational course, such as is suitable for school purposes, may be carried out without any smells being produced, although, since it is necessary to use acids, irritating acid fumes must occasionally be dealt with. It is also often supposed that it involves a succession of brilliant experiments, such as the firework displays witnessed on burning substances in oxygen, the explosion of mixtures of oxygen and hydrogen, &c. But this again is incorrect: experiments, and indeed nothing but experiments, do in fact constitute a rational course—and herein lies the great charm of the subject as well as its educational value—but the experiments, as a rule, are of a most ordinary and humdrum character.

All changes involving alteration in composition are chemical changes; such changes are ever going on even in the inanimate world, and affect all the materials with which we have

to deal, whilst life, whether animal or vegetable, is but a succession of such changes.

It should not be necessary to argue in favour of the study of a subject a knowledge of which enables us to appreciate the nature of the material changes going on throughout the universe, especially if we are assured that the study can be so conducted as to afford mental discipline of a high order such as cannot well be imparted in any other way.

But to attain this end, the chemistry taught in schools must not be the chemistry of the professional student and technical chemist, but must be carefully based on scholastic requirements. The cookery-book receipt style of teaching must be abandoned in favour of the *heuristic* method; it matters not for all ordinary purposes how oxygen, for example, may be prepared, but it is important that everyone should have some understanding of the use of the oxygen in the air and of the manner in which it performs its functions.

For purposes of illustration, I will now discuss the 'syllabus' put forward last year by a Committee of the Incorporated Association of Headmasters, of which I was a member. It is in effect an adaptation of that previously proposed by the Committee specially appointed by the British Association in 1889 to consider the teaching of Chemistry in Schools.

The following explanation is placed at the head of the syllabus:—

Whilst the main object of the course should be to train students to solve simple problems by experiment—to work accurately and with a clearly defined purpose—and to reason from observation—the instruction given should eventually lead them to comprehend the nature of air, water, "fire," earth, and food.

It will be noted that students are not to be *told* about things, or even to be *shown* things, but are to be trained to

solve problems by experiment—that is to say, they are to be trained to *discover*; and their discoveries are to have reference to common objects and phenomena. Moreover, they are to be taught to work accurately; whatever they do is to be done with a clearly defined object in view; and every observation is to be utilised and reasoned upon. It is not expressly stated, but it will appear from the context, that with the object of encouraging accurate work, quantitative methods are to be adopted whenever possible. In short, the chief object of the course laid down in the syllabus is to impart knowledge and full understanding of method, not information alone, although much information is incidentally gained in the course of the work.

According to the first paragraph :—

1. Candidates should be familiar with most of the common substances occurring naturally (such as sand, flint and quartz, chalk, limestone and calc spar, clay and slate, gypsum, galena, hæmatite and clay iron ore, iron pyrites, tin stone) and with the various metals and other substances in common use (such as the common acids, soda, salt, alum, whitening, lime, sulphur, sugar, starch, fats, oils, bone, different woods, charcoal, coal, coke, alcohol, turpentine, etc.).

Indications of the kind of familiarity they would be expected to show are given in the following paragraphs :—

2. They should be able to describe the appearance and other obvious properties of such substances, and, in the case of many, to state what they are principally used for, and to give some account of their origin ; they should know if anything, and what obviously, happens to those with which they are most familiar under ordinary conditions, in contact with air or water or when burnt, and be able to describe what happens in ordinary language without, however, attempting to give any chemical explanation.

3. They should have determined the relative density of most of the substances mentioned.

4. They should have examined their behaviour with water and other liquids, including acids, and have learnt how substances such as salt, soda, and alum can be crystallised from water.

It has been objected that the list of substances given is too long, and that to carry out their examination in the manner proposed is impossible. I believe the very reverse to be the case. If the instruction last but a short time—which is too frequently the case—no doubt the list is too long; but the syllabus is not intended to meet such cases. It is intended for those who desire to make the teaching of scientific method a part of the ordinary school course from the very earliest years onwards. The work contemplated in these paragraphs should, in fact, be begun at the outset, and be gradually completed as the students became able to execute the experiments: the determinations of relative density, for example, obviously cannot be carried out until some progress has been made and the student has at least learnt to weigh, nor until he understands simple division in arithmetic.

Much may be done, however, by children even before they are able to read and write. They may collect, for example, stones of various kinds, bits of metal, different woods, &c., and note not only their appearance, but also whether they are soft or hard, their use, where they occur, &c.—everything, in fact, that can be learnt about them, without the aid of books or teacher, by direct observation and trial. It is astonishing how much may be found out by merely scratching with a nail or knife, by cutting, by beating out, by powdering—and the apparatus for such trials is always at hand: an ordinary polished flat-iron affords a most convenient anvil on which metals may be beaten out and brittle substances reduced to fine powder by means of a hammer. Whatever be done, the great object must be to lead children to notice and compare—to connect definite properties with

definite objects—to describe in such a manner that it becomes possible to gain from their descriptions some clear idea of the character of the object under examination.

The exercises should be repeated over and over again, so that the habit of characterising objects may become a fixed one. The principle involved in the determination of relative density by either the hydrostatic or the bottle method is easily learnt in the course of a few trials; but in order to cultivate manipulative skill, and especially to emphasize the importance of being able to state, not merely that particular substances are heavy, but exactly how heavy they are relatively, it should be insisted that the density of every substance brought under examination be determined.

In studying solubilities, watch-glasses should be used in order to encourage both economy and neatness of manipulation. A minute quantity of the very finely powdered substance being placed in the watch-glass, a few drops of liquid are added; in the case of acids, a dropping tube should be used for this purpose. If necessary, the watch-glass can be warmed on a hot plate.

The use of acids as well as of water and other liquids should be *led up to*, so that it may be *discovered* that they often behave in a special manner. Thus it may be suggested that, as some things dissolve easily, and others apparently not at all, in water, the behaviour with water of the various substances at disposal should be tested; and as soon as this is done, that other common liquids should be tried—such as vinegar, spirits, &c. When it is observed that some few substances, such as soda and whitening, are affected in a peculiar way by vinegar, which is sour or acid, attention may be called to the existence and common use of other acids, such as spirits of salt or muriatic acid, aquafortis and vitriolic acid, and these may be placed at the disposal of the student. The competent teacher will be able to induce his or her students

to carry out a great variety of experiments, leading to the discovery, among other things, that acids usually altogether change the character of a substance in dissolving it. It is perhaps not superfluous to insist here that no word of explanation should be given at this stage—such discoveries should be specially noted down for future discussion, and it should be as impossible for the young investigator to learn in advance what will ultimately be found out as it is for the traveller in an unknown region to be told in advance what he will light upon at his journey's end.

If at the earliest possible moment students are led to write out careful descriptions of the things they have collected and examined, of what they have done and seen, and if attention be paid to the way in which such accounts are written, both as regards writing and style, most valuable literary training will have been given. No point in connection with the scheme under discussion is of greater importance than this.

5. Different natural waters should have been evaporated and the presence of dissolved solid matter ascertained, and its amount. Purified water should have been prepared by distillation. The appearance of air bubbles on heating water should have been noted and the amount of "air" dissolved in water approximately determined.

The study of water may well come next, and may be *led up to* in various ways. The above paragraph relating to water has been inserted in the I. A. H. M. syllabus in order to mark the importance of certain experiments with water being carried out at an early stage in the course; but it is not necessary to introduce such experiments exactly at this point, nor to restrict the examination of water in the manner indicated. It is, on the contrary, undesirable in a school-course to draw any marked distinction between chemistry and

physics, and the order in which the exercises are introduced should be allowed within limits to depend on circumstances.

Probably the most desirable plan of commencing the examination of water, in the case of those already familiar with the hydrostatic method of determining *relative* density, will be to make them determine the density of water by weighing a heavy cube of known dimensions in air and water, and thus *discover* approximately the relation between the gramme and the cubic centimetre. By then determining the density of ice[1], of cold water and of boiling-hot water[2], they would discover why ice floats on water, and note the expansion of water on freezing as well as on heating. The effect of heat on water might then be more fully studied, and at the same time the use and theory of the thermometer made clear.

All are accustomed to see water heated, but usually in such a way that it is difficult to notice what happens. By heating water in a glass flask over a gas flame, opportunity is given for all sorts of observations to be made: thus if the water be at all cold, liquid at first collects on the *outside* of the flask above the flame, but disappears as the water in the flask is warmed; air-like bubbles, too, often collect on the inner surface of the flask, become detached and rise at intervals to the surface. Notes of observations such as these serve later on to suggest other experiments.

The water gradually becomes hot—and the question arises: how hot? This leads to the introduction of the thermometer, and a variety of exercises involving its use may well follow.

Attention is drawn to these points because the great object

[1] By taring a measuring cylinder containing cold turpentine or petroleum, then—after noting the height of the liquid—dropping in a lump of dried ice, at once noticing the height of the liquid, and finally weighing, to ascertain the weight of the ice.

[2] By means of a bulb filled with water and provided with a tube drawn out to a fine point; the bulb is heated in steam.

of the teacher should be to train students to help themselves —not always to require telling what to do and how to do it —to observe *everything* that happens, and, sooner or later, to *make use* of every observation for the devising of a new experiment or the deduction of conclusions.

The discovery and determination of the amount of solid matter dissolved in ordinary waters may be led up to in several ways. Solid matter is deposited on the surface of the flask when many ordinary waters are boiled—not, however, from rain or distilled water; the kitchen kettle and boiler usually become coated with 'fur.' In such cases, the suggestion to see what is left when the water is all boiled away (and later on to find out how much is left when a known quantity of water is evaporated, say, in a weighed glass dish) follows naturally. Again, the taste of sea water serves to suggest that it may contain salt. In whatever way it be arrived at, the determination of the actual amount of matter dissolved in different waters is an exercise of great importance as conducing later on to the appreciation of the difference between hard and soft waters.

6. They should have made simple *quantitative* experiments on the behaviour of typical organic, mineral and metallic substances when burnt or strongly heated.

The next set of exercises prescribed in the syllabus, involving quantitative observations on the behaviour of different substances under the influence of heat, are of great importance; they are an expansion of the qualitative experiments prescribed in art. 2, and may, if it be thought more desirable, be incorporated with those prescribed in art. 7, especially in the case of students sufficiently advanced to reason from observation.

In any case, qualitative observations on the effect of heating common solids should precede the detailed study of such changes: exercises of this kind are of a most instructive character and are very easily carried out.

To burn organic substances, the method adopted in the laboratory in burning filter papers may be followed—in fact a good exercise to commence with is to roll up a filter paper, to wind one end of a piece of platinum wire two or three times around it, and, while holding the other end of the wire steadily, to set fire to the paper and allow it to burn away, taking care that the charred matter does not fall out from within the coil. If this charred matter is then carefully burnt away by means of a small non-luminous 'Bunsen' flame, alternately held under it and then removed (in order to allow access of air), only a minute amount of ashes remains. But when wood—a bit of an ordinary match—dried leaves, shreds of dried meat, a splinter of bone, &c., are burnt, the quantity of ashes left is larger; the difference in the amounts serves to suggest that the experiments should be made quantitatively *in order to obtain definite information as to the amounts*, so that it may be possible, for example, instead of stating vaguely that bone gives a good deal of ashes, to say what percentage it yields. The value of definite statements in such cases cannot be too soon or too strongly insisted on.

Much opportunity is given in the course of such exercises for the cultivation of exact habits of observation. Thus when sugar is heated—best in a small shallow platinum dish—it quickly melts, turns brown, boils up, catches fire and burns, a puffed-up charred mass ultimately remaining, which slowly burns away on continued heating. Fat also melts, but soon catches fire, and, without passing through such a series of changes, quietly and entirely burns away. Starch does not melt, but soon chars; dried lean meat behaves much like starch, but emits a horrible smell. The differences thus observed serve to suggest that the substances themselves are very different. But a careful observer can see much more than a careless one. In the case of sugar, for example, it is found that, when very cautiously heated, it at first

affords a colourless liquid, which then rapidly becomes brown, and afterwards black; when fizzing begins, at first a 'steam' which will not take fire is given off, then something which burns with an almost non-luminous flame, then something which burns with a highly luminous flame—so that it would seem that many successive changes occur as the heating is continued. It is clear also that there are two stages—the baking stage, during which apparently something is being driven off, and the burning stage.

The results obtained on heating metals are also most instructive. Thus, when a piece of thin bright copper wire is held in a flame, it soon blackens; on tapping the wire lightly with a hammer, a scale peels off, which is very brittle. A bright iron wire or nail behaves similarly; but magnesium and zinc take fire and are reduced to white ashes. In all cases, however, the metal yields an *earthy* substance when burnt. When the amount of 'ashes' given by the metal is ascertained, the striking result is arrived at that the ashes weigh more than the metal which was burnt—surely this gives food for reflection.

Earthy substances such as sand, clay, chalk, limestone, &c. apparently undergo little change when burnt—yet every bricklayer knows that chalk and limestone are both profoundly changed, as their ashes behave in an altogether peculiar manner when wetted, becoming very hot, and slaking or falling to pieces if originally in lumps.

The study of chemistry proper, which is led up to by these preliminary studies, begins with the study of the nature of the changes which attend burning, &c. It has, unfortunately, been our practice to *fling* facts at our pupils, and to expect them to assimilate them for subsequent use. We sometimes also demonstrate by experiments the facts we wish to make them acquainted with; but we practically never put them in the position of the original discoverers, and therefore do little

towards enabling them to be discoverers in their turn. If we do not feed them entirely on uncooked food, the food is so ill prepared, so rich in quality, and so excessive in amount, that their digestive powers are all but ruined. In future, we desire to adopt a more considerate attitude; our syllabus therefore provides as follows:—

7. The study of changes such as attend the rusting of iron and the burning of ordinary combustibles should then have been entered on, and a series of experiments made whereby they have been led to *discover* that the air is concerned in such changes, but not as a whole—that, in fact, it contains an active constituent; the extent to which this constituent is present should have been determined, and they should have been led to appreciate the *general nature* of the changes which attend its withdrawal. Attention should have been directed to the character of the products, to the resemblance which many of them bear to earths, and to their behaviour towards water, acids, etc. In some cases, *e.g.*, copper and lead, they should have ascertained the extent to which the active constituent of air is fixed when the substance is burnt, thus becoming familiar with the existence of *compound* substances formed from *definite* proportions of substances differing altogether from them in properties.

There is no case of change with which students generally are better acquainted—no case which lends itself more readily to experimental investigation—no case which affords more important results—than that involved in the rusting of iron; I always prefer therefore to lead students to investigate this in the first instance. I have elsewhere described the mode of proceeding in the following terms:

At the beginning of a course I would give no definitions whatever—would say nothing about the differences between changes; but having directed attention to the constant occurrence of change, would suggest that changes should be studied in order, if possible, to discover their nature: for the study of

change is the business of the chemist, and no wider nor simpler definition of chemistry can be given. The method is in no way novel: it is the historical method—that used in days when examinations and text-books were not, and used in principle by every explorer. For instance, I would call attention to the rusting of iron—a crime against Nature done by Nature's hands which man has constantly to deplore. Students who have already enlisted in that new force of science detectives which in the future is to render such service to our country, well read in Edgar Allen Poe and other writers of works on scientific method, will naturally in the first instance study the victim—the rust; moreover, finding themselves placed in a better position than their colleagues in the police force, inasmuch as they can have before them at the same time, if not the actually victimised iron, at least what they know to be the twin sample, as well as the rust, they will carefully contrast the unaltered with the altered substance. Having previously been well drilled in the practice of elementary physical measurements, they will require little telling to determine among other things the relative density of each in order that they may be able to insert indisputable numerical data in place of vague statements in the report they ultimately draw up—following the practice of the ordinary police detective, who is not content to describe the victim as tall or short, but takes his photograph nowadays and measures him and states the actual height in his report to headquarters. It is then ascertained that the rust is specifically much lighter than the iron, whence arises the idea that *perhaps* something is given up by the iron in rusting. How is the clue thus opened out to be followed? Surely by contrasting the weight of the rusted with that of the unrusted iron. Iron nails or tacks, or borings or turnings free from grease, are therefore weighed out in a saucer, for instance, and—as it is well known that iron rusts only when wet—are then wetted; after some time, when rusting has taken place, any water adherent to the rusting iron is removed by baking it. On again weighing, a considerable increase is noted. Thus it is discovered that *something* from *somewhere* becomes added to the iron during rusting. A very definite clue to the mystery is thereby gained. As water is so necessary to rusting, is not perhaps

the water the active agent in rusting? How can this be tested? Surely by shutting up iron, say in a bottle, along with water. When this is done little alteration is noticed, so that water alone cannot be the cause of rusting. What other associates has iron during rusting? Surely air. A little consideration suggests that iron should be shut up along with air over water. This is done, and it is observed that as the iron rusts the air disappears, but never to a greater extent than about one-fifth.

In this way not only is it discovered what happens to iron in rusting, but students find out that the air plays a part, and an interest is awakened *in air*. They then at least easily appreciate, if they do not naturally ask, the question—Is it perhaps concerned in other common changes which take place under such conditions that air may take part in them? In cases of burning, for example? Such are then studied, and it is soon discovered that the air is concerned; but again only to the extent of at most one-fifth. Ultimately, on investigation, all changes which go on in air are found to be changes in which one particular constituent of the air is concerned, and students sooner or later learn to know this active substance as oxygen. Working in such a manner, nothing is stated or taken for granted; step by step everything is discovered, and the discoveries made are obviously of a most important character. Thus it is not only ascertained how iron rusts, but the nature of air is disclosed and the purpose it serves made clear; and the nature of fire—that it is the outcome of the union of certain substances—is also in a measure displayed.

The following list of experiments is given in the I. A. H. M. syllabus as appropriate for the purpose of carrying out the provisions of Art. 7.

(Discovery that air is concerned in common changes, such as the rusting of iron, combustion, etc., and that its activity is due to one constituent.) The proposal having been made to study the rusting of iron as an instance of a change of very common occurrence, a careful comparison should be made between iron and iron-rust, including the determination of their relative densities, as it is noteworthy that rust is apparently a light substance in comparison with iron. It being found that rust is considerably

less dense than iron, in answer to the question, What does this suggest? it may be said that perhaps the iron loses something in rusting. The following are then appropriate experiments :—

A. A weighed quantity of iron borings, or turnings, or small French nails, is wetted, allowed to rust, dried and weighed ; the mass is then broken up, wetted, exposed, dried, and again weighed, this being done several times.

B. Clean French nails are corked up in a medicine bottle full of recently boiled distilled water.

C. A muslin bag full of iron borings is exposed in air over water, this experiment being made several times.

D. Iron (coarse powder or bright fine wire) is strongly heated in a tube through which air is passed, and any alteration in weight ascertained.

E. Fine copper-wire is similarly treated, an experiment being made, for comparison, in which the copper is heated inside a sealed tube.

F. A candle is burnt in air over water, then a jet of gas, a spirit or petroleum lamp, sulphur, and phosphorus.

G. Phosphorus is burnt on a tile under a shade.

H. A small piece of carefully dried phosphorus is burnt inside a dry Florence flask full of air shut in by a rubber stopper ; the flask is subsequently opened under water, and the amount of water which enters is measured and compared with that which the flask will hold. The results of several such experiments are compared. By weighing the flask both before and after burning the phosphorus, proof is obtained that the heat which escapes is immaterial.

I. A small stick of phosphorus is exposed in air over water. Iron turnings are subsequently exposed in the residual air from this experiment, and phosphorus in like manner in the residual air from experiment *E.*

K. Phosphorus is placed near to the end of a short tube packed with asbestos, and the tube having been weighed, air is slowly drawn through the tube, and the phosphorus fired ; care must be taken to prevent the escape of fume.

When the phosphorus is burnt out, the tube is allowed to cool, and is then weighed.

N.B.—The tube should be about $\frac{3}{8}$ in. wide and 6 in. long, drawn out at one end. Fibrous asbestos is carefully pushed in to form a respirator, then a piece of phosphorus, and then a $\frac{1}{2}$ in. plug of asbestos. The air is sucked through by means of an aspirator with a screw clip, and it is well to insert a wash bottle between it and the tube.

L. The gas left on allowing iron to rust in air is passed over heated copper.

M. The extent to which finely divided copper increases in weight when fully burnt is determined.

Experiments *D* and *E* come naturally after the discovery is made that air is concerned in the rusting of iron, as the question then arises whether the changes which iron and copper undergo when heated are changes in which air is concerned. On the other hand, assuming that it has been previously ascertained that iron and copper gain in weight when burnt, the question arises—'What happens to iron in rusting?' and experiment *A* naturally follows.

The use of phosphorus may be introduced by a reference to matches. Matches take fire very easily—what is it that takes fire?—phosphorus. Since, then, phosphorus takes fire so easily, it may well be used in making experiments, especially such as are indicated under *H*, in which the burning takes place in absence of water.

The final experiment suggested under *H* is an important illustration of the manner in which side issues may be advisedly or incidentally considered. In order to be sure that nothing escapes from the flask during the burning of the phosphorus, the teacher suggests that the flask with its contents be carefully tared both before the phosphorus is burned and afterwards when the flask is again cool. If it be found that the weight does not change, what follows? The teacher

may ask—Does not something escape? Does not the cooling involve the escape of heat?

In experiment *I* an answer is obtained to the question whether phosphorus and iron, which apparently affect the air similarly—in so far as the observation of the diminution in bulk which the air suffers enables us to judge—actually withdraw the same constituent.

Experiment *K* is made in order to ascertain if that which disappears from the air when phosphorus is burnt becomes affixed to the phosphorus.

Experiment *L* is an illustration of the value of a negative result. It is difficult when heating copper in air to ascertain, by observing the diminution in volume which the air undergoes, whether it affects the air in the same way as iron does; but, obviously, if that which remains after iron has been exposed in air be without action on copper, it follows that the constituent withdrawn by the iron during rusting is that which affects copper.

The isolation of the active constituent of air is next considered.

8. Attention having been called to the production in large quantities of the substances formed on burning various metals (iron scale, copper scale, litharge, red lead, zinc white), the attempt should be made to separate the active constituent of air known to be present in these by strongly heating them, such attempt being based on the previous observation that some earthy substances (*e.g.*, chalk) lose in weight when strongly heated.

This paragraph is amplified in the following manner in the section of the syllabus in which experiments are suggested.

The various solids obtained by burning metals (magnesium, zinc, lead, copper, iron) in air—their appearance—their production on a large scale—special behaviour of lead: litharge and red lead, how produced and converted into each other; their behaviour when heated strongly tested by the balance; separation of gas

on heating red lead; discovery that this gas supports combustion, and that it acts on copper as air does. Reproduction of air on mixing this active gas with the inactive gas (nitrogen) left on exposure of iron in air. Formation of an acid solution when the solid formed on burning phosphorus is dissolved in water—explanation of the name *oxygen*. Preparation of oxygen from potassium chlorate; combustion of various substances in it.

It stands to reason that the various 'earthy' substances formed on burning metals &c. contain the active constituent of air—the question is how to separate it from them. A few questions soon bring out the fact that many of the substances —such as iron rust, iron scale and copper scale—may be had in large quantity almost for the asking; it may then be stated that zinc is burnt in large quantities to make zinc white, which is used as a paint, and that lead also is burnt on a large scale—indeed in two ways, so as to form either litharge or red lead. Attention to the special conditions under which the two earths are formed from lead affords a suggestive clue deserving of examination; since both are formed on heating lead in air, and the one is converted into the other by heating, it is probable, taking previous observations into account, that both consist of lead *plus* the active constituent of air. Proceeding to study the change of red lead into litharge as the easier to examine, and working quantitatively in order to obtain precise information, the student discovers that the red lead loses in weight: something therefore is given off from it, probably a gas as nothing is seen to escape; the experiment is therefore so modified as to permit of the collection of whatever escapes. Of course, if it has been ascertained in previous experiments that such a substance as chalk loses in weight when burnt, the experiments with red lead are all the more easily appreciated.

I believe the discovery of oxygen in such a manner to be

an exercise of the highest educational value: whereas to tell a student how Priestley first made oxygen is but to impart interesting information.

9. It having been previously observed that when metals such as iron and zinc dissolve in acids, a gas is given off which burns, this gas should now be studied with the object of finding out what happens when it burns. Having ascertained that it affords a liquid when burnt, they should have compared this liquid with water—which it resembles in obvious properties—by ascertaining its density, freezing-point and boiling-point. Having thus discovered that water is formed on burning the gas in question, they should have been led to discover that oxygen is also concerned in its formation, and to produce it from oxides such as those of lead and copper. They should then have made quantitative experiments from which they could infer the composition of water by weight. The properties of water should have been contrasted with those of its components, and the production of heat as a consequence of the association of the two gases, and in other cases of association consequent on and attending burning should have been thoroughly grasped—in fact, at this stage, a full general understanding of the nature of combustion should have been arrived at, and the evolution of a definite amount of heat, as a consequence of the formation of a definite amount of the compound substance, should have been made thoroughly clear to them.

Our syllabus next recommends a course leading up to the chemical study of Water. In studying water, the discovery —already foreshadowed in the results obtained on burning copper, for example, quantitatively—that combination takes place in definite proportions is clearly brought home to the student, whilst, at the same time, the nature of combustion is fully elucidated.

At the outset, however, the object is not to study water but the interaction of acids and metals, introduced by some such argument as the following:—So much having been learnt

by studying, in a systematic and scientific manner, a simple case of change, such as that which iron undergoes in rusting, it is clearly desirable to subject other cases of change to a similar examination. Thus, as I have said elsewhere,

after studying the corrosive action which acids exercise on various metals, students will desire to know what happens when they dissolve metals in acids. How should they find out? Treating the matter as one requiring the exercise of the detective's tactics, and students as a band of young detectives, the last thing to do is to tell them,—the only possible greater sin being to chalk up equations having no real meaning in their eyes in explanation of what goes on—for in my opinion, at this stage, no students in our new force should have the least conception of the meaning of symbols, formulæ and equations; they should gain several good-conduct stripes for other work of more immediate importance to the force at large before being allowed to enter on such a beat.

Taking metals such as zinc and iron, and perhaps magnesium, and acids such as vitriolic and muriatic, they would dissolve these metals in the diluted acids, economising always by taking, in the first instance, definite small quantities of acid and metal; for "waste not, want not" should be the maxim inculcated from the very beginning in all such work, as it is of the essence of all truly scientific practice.

But in order again to be in a position to report in the most definite possible and unmistakable terms to headquarters, the young detectives should be led to ascertain—than which nothing is easier—exactly how much gas is given off in each case both by definite quantities of each metal and an excess of acid and definite quantities of acid and an excess of metal. They would thus discover that the amount of gas varied with the metal, but not with the acid, and other interesting quantitative relationships would also be disclosed, throwing light on the origin of the gas and the nature of the changes.

Proceeding next to examine the gas given off in each case, having collected sufficient, they would test it. How? How had gases been previously tested; what gases had been examined? Only those from air, and of these it was known that only one

allowed ordinary combustibles to burn in it. Testing the gas from each metal and either acid in this way, in each case it is found that it burns. The gas is therefore evidently different from both constituents of air. "What more can be done with it?" asks the inspector-teacher. To which the answer should come, "Surely, sir, as all burning things we have studied have burnt at the expense of the oxygen in air, this gas probably does so likewise; and if so, it may be expected to give some product. We ought to find out how it burns, and what is formed from it." "Good! I leave you to set to work and follow out this clue. No better suggestion could be made," says the inspector-teacher. They soon find that the new gas will not burn in azote—the inactive part of air, but will burn readily enough in oxygen. On arranging an experiment to see what happens when it burns in air, in which the gas is burnt from a jet placed inside a clean bell-jar full of air standing in a dish containing water, it is noticed that as the gas burns, the water gradually rises—proving that the air is used up, as was to be expected. At the same time the cool upper surface of the jar becomes "bedewed." "Hallo!" remark the young investigators, "evidently there is a liquid product formed. We must get more of this and see what it is." Some of them may have at some time noticed that when a clean kettle full of cold water is first put over a gas flame, liquid condenses on its surface, and may suggest that by burning the gas they are studying just under a flask kept full of cold water, they will be able to collect enough of the liquid for examination. Having fitted up an apparatus which enables them to constantly generate the gas, they do this, and at the end of perhaps half an hour have collected sufficient liquid for examination. It looks like water. Is it water? How can this be found out? Surely by comparing it with water; but how? Well, what do we know of water? We know that it freezes in winter, and boils when made hot enough; that the ice melts at a particular temperature, and that the water boils at a particular temperature. Some water is therefore frozen around the bulb of a thermometer affixed by means of a loose cork near to the bottom and in the axis of a small test tube, the freezing being done by means of the penny iceman's mixture of ice and salt; when the water is frozen, the tube is detached by slightly warming

it externally, leaving a cylinder of ice attached to the thermometer. The temperature at which the ice melts is then noted. Then, taking the liquid to be compared with water, this is in a similar manner frozen around the thermometer bulb, and the ice is then allowed to melt, taking care to collect the liquid from it in a test tube held under it; the melting-point agrees with that found for water. Next, a little cotton wool is wrapped around the thermometer bulb, and the thermometer is held in the axis of a test tube in which a small quantity of water is briskly boiled. A similar experiment is subsequently made with the liquid from the gas. The two boiling points agree. There can be no doubt, then, that water is produced when the inflammable gas burns, and as the gas gives rise to water when burnt in oxygen that water in some way contains these two gases. The gas may in future—if we are prepared to talk Greek, and Englishmen very often are—be termed hydrogen, which means water producer.

Just consider what an important discovery is thus made, and how much is learnt in making it. But who could imagine that the study of what happens when the zinc worker dissolves some spelter in spirit of salt would have led to the establishment of so remarkable a fact as that water is composed of two gases—hydrogen and oxygen? It is just in this way, however, that important discoveries are almost always made.

I trust the examples quoted will suffice to make my meaning clear—that it will be seen that instruction given on such lines must have the effect of raising the intelligence of the student and developing habits of self-helpfulness. That students so taught will not only gain knowledge of facts, but also of method—of scientific method, which is of far more importance. That they will learn to work with a purpose and to devise experiments calculated to afford definite information as to certain clearly defined issues; to work cautiously and exactly; to observe carefully as well as to make use of their observations; and to be logical and guarded in their judgments.

A typical earth is next studied.

10. Passing next to the study of earthy substances, chalk should have been chosen for examination, on account of its

resemblance to substances formed on burning metals such as zinc, etc., in air. It should have been carefully contrasted with lime, to bring out the fact that it is profoundly changed when burnt. The conversion into lime should have been studied quantitatively. Its behaviour towards acids should then have been examined, and the discovery made that the gas which escapes is equal in amount to the loss which it suffers when burnt to lime: this being suggestive of the conclusion that "chalk-stuff" is composed of "lime-stuff" and the gas in question, experiments should have been made to reproduce chalk-stuff from lime-stuff and the gas. The discovery of the composition of chalk-stuff in this manner should also involve the accidental discovery of the formation of chalk-stuff on exposure of lime-water to air, and the consequent discovery of the presence of "chalk-stuff gas" in air.

The following indicates more fully both the character of these experiments and the order in which they are made with most advantage.

Comparison of chalk (whitening) with lime—slaking of lime—determination of the increase in weight—solubility of chalk and lime; preparation of lime water. Loss in weight when chalk is strongly heated (quantities of about a gram may without difficulty be "burnt" in a small porcelain crucible over a good Fletcher burner, and still more easily over a blowpipe flame (a French petroleum blowpipe burner is sold by Townson and Mercer which is admirably adapted for this experiment), or in a muffle. Action of acids on chalk—the gas incombustible—measurement of the amount given off—comparison of its density with that of hydrogen, oxygen, and nitrogen—determination of the weight given off on dissolving chalk in acids. Exposure of lime in atmosphere of gas from chalk and acid—its reconversion into chalk-stuff established by the behaviour of the product to acids, the change in weight which attends the conversion, and the behaviour of the product on ignition. Examination of the solid formed on exposing a considerable quantity of lime water to the air—*e.g.*, its behaviour towards acids, determination of the extent to which it loses on ignition, and of the amount of gas evolved on dissolving it in acid.

Although little need be said on this part of the syllabus, as it is self-explanatory, the motive with which chalk is advisedly chosen as the subject of examination at this stage may with advantage be somewhat more fully explained.

The experiments previously made will have led students to discover the nature of air and its functions; to discover what water is; and to discover, in a measure, the nature and origin of fire; to complete the programme, it is desirable for them to gain some knowledge of the fourth 'element' of the ancients—earth. Their experiments on the rusting and burning of metals will have made them acquainted with a number of substances which they know to be oxides closely resembling the common earths. The question then arises whether these latter may not be oxides, and it is from this point of view that chalk should be studied. It is found to consist of two substances, one of which presents all the characters of a metallic oxide such as magnesium or zinc oxide. If desirable, the study of this substance may be continued at a later stage.

With regard to the method of working and the nomenclature used—on which I lay great stress—I may quote the following remarks from an address on 'Science teaching in schools in Agricultural Districts.'

I have insisted on the importance of exercises in measuring and weighing being introduced from the very outset of the course, and let me now impress on you how desirable it is that, whenever possible, a quantitative form should be given to the experiments—and nothing is easier. Let me take as an example the action of acids on chalk and limestones. If you demonstrate to a class that gas is given off, or even allow your class to carry out such experiments in test tubes, and then talk learnedly about carbon dioxide or carbonic acid, a certain amount of information may be conveyed which is interesting enough in its way; but experience shows that such work is of but slight value as mental discipline, and even that knowledge of the facts is rarely retained, if ever correctly gained.

Whereas, if you set your scholars singly or in small groups to carefully weigh out quantities of about a gram of powdered whitening, and then let them dissolve these in acid and measure the amount of gas given off, a lesson is learnt which is an abiding one: they soon find out that the action is of a definite character—that "chalk-stuff," in fact, is characterised by yielding, when dissolved in acid, a certain number of cubic centimetres of gas per 100 grams, the gas having, as they subsequently ascertain, certain peculiar properties; and the volume of such gas which is evolved becomes an infallible test for chalk-stuff, and later on enables an estimate to be made of the amount of chalk-stuff in a soil. Chalk being the name of a particular kind of rock, not of a definite substance, I advisedly use the word "chalk-stuff" as descriptive of the essential component of chalk and limestones, and I call the gas from these "chalk-stuff gas" so long as it is not known what the gas consists of. The apparatus for these experiments is, as you see, of the simplest possible character, and the whole operation may be carried out within ten minutes by almost any one. I weigh out the whitening in a cigarette paper: gathering the edges of the paper together so as to form a little bag, I drop the bag into this small wide-mouthed bottle—a 2-ounce acid-drop bottle—and then pour in a little water, and cautiously sludge the chalk with this. Now I pour acid into this little test-tube, which, as you see, can be easily introduced into the acid-drop bottle without acid being spilt, resting against the side just under the shoulder. A rubber stopper carrying a short glass tube is now inserted, and connection established by a length of narrow rubber tubing with the tube just passing through the upper neck of a "tubulated" bottle holding about two litres of water—that is to say, a bottle having a second neck near to its bottom at the side. The bottom tubulus has fitted into it a stopper through which passes a tube bent upwards at a right angle and bent over at the upper end. The tubulated bottle rests nine inches or so above the table on a stand, a 500 cc. cylinder being placed to catch the water as it flows from the upper end of the side tube when the acid is brought into contact with the chalk by tilting the small bottle sufficiently to pour out the acid from the little test-tube. The water which is thus collected is obviously equal in volume to the gas which is given off. You see

that, including the weighing, the experiment is carried out in little more than five minutes. Experiments of this kind, I venture to think, are of the very highest value as training, besides teaching lessons which are of importance.

Soda will have been among the common substances in domestic use studied qualitatively at an early stage in the course, and note will probably have been made of its peculiar behaviour with acids; attention being recalled to this, its study at this stage will appear appropriate, especially if attention be called to the fact that it is derived from common salt, and that chalk or limestone is used in its manufacture. It is on this account, and also because of the educational value of qualitative experiments on the interaction of soda and acids, that the study of soda comes next in the syllabus.

Experiments similar to those made with chalk should have been made with washing soda, involving the discovery that it contains water of crystallization, and that it resembles chalk-stuff in composition. The definite manner in which it acts on acids should have been established by titration experiments, its use in softening water should also be referred to and examined into, and experiments made to determine hardness by soap solution.

The nature of the experiments to be carried out is more fully defined as follows:—

Examination of washing soda—conversion of the clear crystal into a white powder—the loss in weight attending this change—reconversion of the white powder into clear crystals by crystallization from water—separation of liquid from the crystal, by distillation, and its identification as water.

Action of acids on soda—examination and identification of the gas—the amount given off—titration of soda solution by acid solutions and discovery of the definite character of the action—separation of product from solution by crystallization—the weight of product formed. Production of chalk-stuff on adding soda solution to lime-water or to solution prepared from chalk and an acid proved by carefully comparing the product with chalk-

stuff. Presence of chalk in natural waters—its deposition on boiling—effect of adding soap solution to lime-water—measurement of the amount of soap solution required to produce a permanent lather in distilled water and natural waters before and after boiling.

The study of food materials comes last in our syllabus, and ends with the discovery of data which make it possible to understand that food is not only of value as contributing the material from which our bodies are built up, but also—and mainly—by serving as fuel: as the source of the *energy* we expend in doing work.

11. Attention should then have been directed to the study of common organic materials—sugar, starch, gluten (from flour), and white of egg being taken as typical examples. The presence of "coal-stuff" or carbon in all of these having been inferred from their behaviour when incompletely burnt, the presence of hydrogen and oxygen will be indicated by their yielding water when destructively distilled.

The manner in which the discovery of the composition of 'chalk-stuff gas' may be led up to, and the use to be subsequently made of the discovery, is sufficiently indicated in the following paragraph—the last in the syllabus:—

12. The formation on burning carbon of the gas previously obtained from chalk and found in the air having been discovered by experiments in which carbon had been burnt in oxygen and the product compared with the gases previously studied, its production from carbonaceous substances generally should have been observed. The composition of the gas should have been ascertained. The conversion of sugar entirely into this gas and water on combustion having been demonstrated, albumenoid substances should have been burnt, and the discovery made of the presence in them of nitrogen in addition.

To those who doubt the value of such work and the possibility of carrying out such a scheme, I can only say: try honestly to test it in practice. It will not be easy to

succeed, but success is worth striving for. Teaching designed to develop habits necessary for the individual, and hence for the race, has hitherto, as a rule, been so conducted in our schools that—as Prof. Fitzgerald says—it stops development along new lines. Nothing could be more fatal to progress. The problem before us is to introduce a method which shall favour development along new lines—there is but one: *the heuristic method;* and if this can be introduced into schools, the problem is solved, as it is the method by which all progress is effected. No opposition can prevent its ultimate adoption—our task, however, is to secure its introduction with the least possible delay.

CHAPTER XI.

BOTANY.

The necessity for instruction in natural science.

It may be fairly contended that scientific instruction in secondary schools should not be confined to the limits of any one or two special 'sciences,' however well-adapted as means of general education, or useful as branches of knowledge. No youth, it may be argued, should leave a secondary school at, say, sixteen years of age without some understanding of such matters as the place of the earth in the solar system, the phases of the moon, the meaning of the great coal deposits, the phenomena which underlie the electric telegraph and the steam-engine, the structure of the human body, and the necessity for pure air, pure water, wholesome food, personal cleanliness, and regular exercise. These are matters which fall under the domain of many 'sciences,' and a selection of one, or even two, would leave out much of that general knowledge, rudimentary and disconnected though it may be, without which a youth is placed at considerable disadvantage at his start in life. How this instruction may best be imparted it is not my present purpose to discuss. I may say, however, that, although an intelligent youth would probably acquire such knowledge for himself during his school years, and although the ordinary class-teaching would materially

contribute to a pupil's fund of general information, it is doubtful whether any secondary school can afford to leave the 'Science of Common Things,' as it has been called, without a definite place, however small, in the time-table.

Assuming then that this general knowledge finds a place in the school course, there is yet much to be said for the more detailed and systematic teaching of one or two special branches of science, and it is not difficult to account for the frequent selection of Botany for this purpose. As an experimental science it is considered a useful means of cultivating the hand and eye, an object increasingly sought in modern systems of education. Other subjects equally serviceable in this respect are open to various objections. Chemistry, it is argued, is expensive to make adequate provision for; Physics, at once expensive and difficult to teach to the young; Zoology tends to become uncleanly and is otherwise impracticable; Geology is largely dependent upon locality; and Botany is accordingly selected as being at once inexpensive, easy to teach, comparatively cleanly, and possible everywhere, except perhaps in schools which are situate in the heart of large towns. In the making of such a selection, the practical utility of Botany for Agriculture and Horticulture is sometimes, no doubt, a determining factor, and it is certain that many parents are gratified to find included in the curriculum of a school a subject the pursuit of which may relieve the monotony of country life, and add a new interest to foreign travel.

The advantages of Botany as a subject for more detailed treatment.

My object in this chapter is to endeavour to show how Botany should, in my judgment, be taught so as to give the best results—both as an instrument for the training of the mind, and as a means of widening and deepening the knowledge of the young during the years of school life.

Object of this chapter.

Limits of age of the taught.

It may be well to state at this point that the secondary school of which I am here thinking is one which provides instruction for boys and girls between the age of ten or eleven as the lower limit and sixteen or seventeen as the upper limit. Where pupils remain until the age of eighteen or nineteen at a school preparatory to the Universities, special arrangements would have to be made other than those described in this chapter. Again, it is implied in what is here said that the teacher is so far free and untrammelled in his work that he may frame for himself such a scheme of instruction as best commends itself to his judgment. For it will be found that the recommendations herein made will involve, for the school stage of Botany, a remodelling of the syllabuses issued by certain examining bodies, and adhered to by most of the popular text-books.

Freedom of the teacher.

Method to be pursued in class teaching.

I would lay down in the very front of my proposals this principle, that all the teaching of Botany in the secondary school should be of a practical character. By this is meant that specimens of plants or parts of plants should be provided, so that every pupil may as far as possible have one such specimen entirely to himself. The class should be seated at desks with flat tops, and each pupil should be supplied with a pocket-knife or scalpel, a pair of mounted needles, a tripod simple lens, pencil and paper. The teacher, too, should have at his disposal a low table and a blackboard. These arrangements made, the teacher proceeds to gather from the pupils in their own words a description of the object under examination, supplements it with additions of his own where the pupils fail, draws its parts upon the blackboard for greater clearness, requires each pupil to draw the same from his own specimen, gives directions as to what dissections should be made, writes down new terms upon the blackboard, and finally requires a

reproduction of the whole at the end of the lesson, or in the interval between it and the next. No text-book of Botany is used in the class-room, and no book-work is prescribed by way of preparation.

Extension of the system of 'object lessons.'

It will at once be seen that this is merely a continuation of the system of 'object-lessons,' which has long found a place in the primary school, where it is destined in the future to have a still greater development. The chief difference is that, while 'object-lessons' have hitherto been more or less disconnected, every lesson being complete in itself, the lessons in Botany here contemplated would form a connected series, resulting, in the course of a year or two, in a fair acquaintance with the elements of the science.

Introductory to Laboratory practice.

Again, this method is represented at a later stage by the laboratory practice of the student in a college. The difference here is that the lectures and their illustrative accompaniments are often unavoidably separated in time, that the student employs the compound microscope for his investigations, and that he is left to a much greater extent to his own resources. There is, however, the same verification of the statements of the teacher as far as may be, and the same careful record of the observations in the form of notes and drawings. The student now begins, if ever, to observe and record on his own initiative.

The teaching in the secondary school should be intermediate between the object-lesson of the primary school and the laboratory practice of the college. The pupil is less in leading-strings than in the primary stage, but more guided and directed than in the later stage.

The provision of actual specimens.

But just as there is no 'object-lesson' without the object, so there should be no lesson in Botany without the specimen or the experiment. Diagrams, however truthfully coloured, and models, how-

ever cunningly executed, should not be allowed to usurp the place of the actual specimens. The enlargements of objects in diagrams and models are always confusing to the beginner, so that, while a figure is useful when the object itself has been seen and examined, it is often a most mischievous substitute. It would indeed be possible for a teacher who was a ready draughtsman to dispense altogether with printed diagrams in teaching the earlier stages of the subject. When they are used, however, it should be to recall the actual object, and not to take its place from the first.

The exclusion of minute anatomy from the course.

It is involved in this method of treating the science that the only appropriate subjects for this stage are those which can be fairly illustrated in the way described. Thus it is not possible adequately to deal with the structure of the vegetable cell, the chemical and physical properties of the cell-wall and cell-contents, cell-division and the histological differentiation of tissues, the details of the process of fertilization, or the development of the embryo, as all such subjects would involve for their illustration the use of the compound microscope, and imply an acquaintance with its methods which it is impossible to attempt to teach to children in a school. It is here that the plan proposed will diverge most widely from established custom. Such subjects as have been enumerated are included in official syllabuses of elementary Botany and occupy many pages of most elementary text-books. It is not uncommon to find a book designed for school use begin with the cell, passing on to the tissues and the organs, and finally devoting a comparatively small space to the grouping of plants into their families. It has been said that a child in his own progress towards manhood lives through again the history of the race. Now the history of Botany shows that the first thing that engaged the attention of man was external morphology

The method of most text-books not a natural method.

and classification, and then, when his methods became more perfect, internal anatomy and histology. So, too, it is the plant as a whole that should first be presented to the attention of the child, then such parts as are visible to the unaided eye, and last of all the minute anatomy of the tissues and cells. It cannot be too strongly urged that the study of cell and tissue, if thrust upon the learner before its time, is not only of little value, but hampers him in his later progress. It burdens the memory, and distracts attention from those parts of the subject which might be made of real interest. It is necessarily acquired solely by means of highly magnified pictures, a process which is in direct opposition to the methods of the experimental sciences.

The mischievous effect of the prevailing method.

It goes without saying that no microscopic organisms—algæ or fungi—are appropriate subjects of study in the school. On the other hand, there is no reason why organisms like ferns, mosses, seaweeds, and the larger fungi which can be readily handled, should not be included in a school-course, so far, that is to say, as their external differentiation and general habit are concerned. It must puzzle a schoolboy to find a book on Botany silent about such a plant as a mushroom, while it enlarges on plants much less familiar. 'Put yourself in his place' is an excellent maxim for the teacher.

The inclusion of all plants which admit of microscopic treatment.

Again, there is no reason why simple lessons on vegetable physiology should not be included in such a course. The exercises will, however, be of less value in proportion as the pupils are unable to repeat the experiments of the teacher. It is a matter of congratulation that we now possess in English a book with the aid of which any teacher may arrange a series of simple experiments to illustrate such subjects as heliotropism, geotropism, transpiration, respiration, and carbon-

The inclusion of demonstrations in physiology.

assimilation. A comparatively small outlay will provide all the apparatus necessary.

The inclusion of extra-British flowers and fruits.

Nor need the material for study be restricted to native British plants and their products. No plants, native or foreign, should come amiss to the teacher of Botany. Many plants like the Dahlia, Fuchsia, Pelargonium, Sunflower, and Laurel are as familiar to children as our indigenous flora, and should be equally included. Again, Brazil nuts, almonds, figs, dates, raisins, bananas, &c. are all serviceable botanical specimens.

The use of technical terms.

A word of warning on the use of technical terms will not be out of place. There is little doubt that the frequent occurrence of difficult technical terms in elementary books has been a real hindrance to progress, and the number of such terms is often in inverse ratio to the size of the book. The first question should be, whether there is any real necessity for a strange technical term at all. 'Salver-shaped' is as good as 'hypocrateriform,' 'funnel-shaped' as 'infundibuliform,' 'seed-plants' as 'spermaphytes,' and so on. When, however, a technical term is desirable, or is thoroughly established in the language of the subject, care should always be taken that the idea covered by the term should be made familiar before the term is introduced. Take for example the term 'dicotyledon.' If the pupil be shown a germinating sycamore with the pair of green leaves unfolding, he will realize the propriety of the term 'seed-leaf' to distinguish these from the ordinary foliage-leaf. When the idea has become familiar by the comparison of other cases, as the beech, ash, cabbage, cress, &c. the term 'cotyledon' may be trusted to make its way, especially if its etymological meaning be discussed on its introduction. 'Dicotyledon,' 'acotyledon,' 'monocotyledon' follow thereupon without difficulty. Again, if it be established

that plants, like animals, require air for the sake of the oxygen, the use of the term 'breathing' might precede that of 'respiration.' So, too, a leaf might be found to be shaped like an arrow-head, and the term 'sagittate' be reached as a relief from the less convenient compound 'arrowhead-shaped.' Teachers should never fail to explain the origin of a technical term, and to call attention to other words from the same source. The lesson in Botany may thus be brought to bear on the lesson in English, just as it may on the Drawing lesson when parts are sketched, and on the lesson in Geography when the native countries of our various familiar exotic plants are ascertained.

The subject may be pursued even in winter.

It may be thought difficult, if not impossible, to pursue the study of Botany in a school regularly throughout the year. This, however, is a mistake. The spring, summer and autumn will, in the country, supply ample specimens of flower and fruit for examination, and the structure of flower and fruit will always form a large part of the subject. Material, too, may be found for study even in the dead of winter. Take for instance a potato, which may be obtained at any season. The eyes, the skin, the starchy interior may be examined; a discussion of its morphology, whether stem or root, follows; and then the instructive phenomena attending its sprouting; and all this is good material for Botanical study. Again, a series of sections sawn off a bough might form a suitable subject for a lesson in the dead season. The pith, the rings of growth, the medullary rays, the circular line of cleavage outside the wood, the stringy bast, the corky bark might be observed, sketched and discussed. The contrast in structure between an apple and an orange, a horse-chestnut and a sweet chestnut, a raisin and a prune, a hazel-nut, a walnut, and a Brazil nut, are all subjects for lessons when fresh material may be difficult to get.

The relation of Botany to allied sciences to be emphasized.

With regard to those regions where Botany merges into allied sciences, it is best at this stage to err on the side of inclusion rather than exclusion. The relations of the plant to the soil may appropriately lead to a digression on the origin and composition of soils, on rich and poor soils, and on the meaning of drainage and the manuring and rotation of crops. The relation of the plant to the air should lead to a digression on the composition of the atmosphere; the relations between animal and vegetable life to the consideration of differences in the methods of nutrition of plants and animals, and to an exposition of the entire dependence of animals upon plants; and so on. In the text-books there is generally some hesitancy in trenching upon the domain of a neighbouring science, but a teacher of the subject in a school would do well to ignore the limits thus artificially drawn for him, and rather to emphasize the inter-dependence and dovetailing of the various sciences.

Aids to teaching.

I now pass on to consider some of the aids to the successful teaching of Botany in the manner which I have attempted to describe.

The supply of fresh material.

The first requisite is obviously a collecting ground for the supply of fresh specimens of shoots, leaves, flowers, and fruit. Teachers whose schools are situate in the smaller towns will find that the country lanes with their hedge-rows and ditches will afford a sufficient supply of material during the greater part of the year. If there be a fringe of sea-shore, a pond, a wood, or a common fairly accessible, it would give an opportunity for the study of the adaptations of plant-life to special conditions. A teacher intent upon his work will soon make himself acquainted with the resources of the neighbourhood. A corner of a field to which the refuse of the town has been carted is often an interesting collecting-ground on account of the number of

escapes which it will afford—hemp, canary-grass, sunflowers, tropœolums, marigolds, caper-spurge, and tomatoes. A ballast-heap near a harbour is always interesting. During inclement weather a teacher will be able to obtain from the florist or greengrocer at a trifling outlay sufficient material for the day's lesson. During the winter season he will similarly be able to purchase from the fruiterer specimens which may be turned to useful purpose.

When in addition to such resources there is a shrubbery or garden attached to the school, as for many other reasons ought always to be the case, or when there is in the locality a park, a nursery, a market-garden, or a greenhouse to which the teacher may obtain access, it becomes less difficult to secure a constant supply of good material.

A record to be kept of material supplied.

A dated record of the specimens examined at each meeting of the class ought to be carefully kept, as it will prove of value for reference during a second year.

A school herbarium to be established.

A *hortus siccus* or dried and mounted collection of the plants of the neighbourhood should be formed in connection with every school where Botany is taught. By its means scholars might be encouraged to identify plants which they collect on their own initiative. Such a collection would moreover supply material for lessons on specific, generic, and ordinal characters, by bringing under the eye at one time a larger number of related plants than would be possible were the teacher to depend solely upon fresh material. Pupils should be encouraged to learn and to practise the method of drying and preserving plants for themselves, and at the end of a vacation their own contributions might help to extend the school collection.

In connection with a herbarium, the teacher will find it of great service to collect and dispose in boxes, in quantity,

specimens which cannot be conveniently mounted on paper. The samaras of the ash, elm, and sycamore, the pappuses of dandelion and thistle, and fruits and seeds of various kinds, could be kept in this way, and utilised when required.

The storage of the herbarium may be made a model of neat and orderly arrangement. Indeed it is better to dispense with it altogether if it cannot be properly arranged and suitably preserved from dust and injury.

It is sometimes convenient to preserve in spirit delicate specimens, or those which are distorted in pressing and drying.

Class excursions.

It need hardly be said that an occasional excursion of the class into the country lanes would prove an agreeable, and at the same time profitable, interruption of the monotony of school-routine. Boys and girls might thus be made aware, perhaps for the first time, that there is much to learn—without the aid of books—by observation and reflection outside as well as inside the walls of a school. On such occasions plant-life should not be permitted to engross the attention of the teacher. Other departments of natural history should, as opportunity offers, come in for a share of attention and comment. The mutual dependence of flowers and insects is a never-failing source of interest and discovery. A visit to a local museum of natural history might be reserved for the dead season.

The place of diagrams in teaching.

I have already alluded to a danger which is associated with the use of diagrams and models. These aids have, however, their place in the system of the teacher of Botany. It is a matter for regret that many of the newer sets of diagrams, especially those which come to this country from abroad, are too histological in their treatment, and too wide in their range, to be altogether suitable for the stage of teaching under consideration. Indeed I know as yet no better sets of diagrams for this purpose than

those of Professor Henslow, published in this country many years ago, and those associated with the name of Professor Oliver.

Of models of flowers and fruits I know of none to compare with those supplied by Brendel, of Berlin. A very useful selection for the secondary school can be made from Brendel's catalogue. One or two compound microscopes for occasional use, and a few standard books of reference, would complete the equipment of accessory apparatus.

The use of models.

Taught in this way, children might, I think, be induced to take a real living interest in the plant world around them, and come face to face with problems of a totally different kind from those which are presented in the other studies of the school. One would then more rarely, I hope, hear the lament 'I have forgotten all the Botany I learnt at school,' or 'I never could get over the hard names.' On the contrary, the school study of Botany might be, as it ought to be, the beginning of a lifelong interest in the subject. Should the pupil pass on to the higher study of the subject, he would find that his school-work had afforded the necessary experience for the appreciation of the more advanced treatises, and that careful observation with the naked eye or with a simple lens is the best preparation for the intelligent use of the compound microscope.

The advantages of the method here advocated.

APPENDIX.

The following Books, &c., will be found useful where the school teaching of Botany is conducted on the lines indicated in the foregoing chapter :—

I. *Class-books.*

Naked-eye Botany, with illustrations and floral problems. F. E. Kitchener, M.A., F.L.S. London : Percival and Co.

Object Lessons from Nature. Parts I. and II. L. C. Miall, F.R.S. London : Cassell and Co.

Elementary Lessons in Botany. Daniel Oliver, F.R.S. London : Macmillan and Co. 4*s.* 6*d.*

First Lessons in Botany. G. T. Bettany, M.A., B.Sc., F.L.S. London : Macmillan and Co. 1*s.*

Primer of Botany. Sir J. D. Hooker, F.R.S. London : Macmillan and Co. 1*s.*

II. Books for Reference.

Natural History of Plants. Anton Kerner von Marilaun. Translated by F. W. Oliver, M.A., D.Sc. London : Blackie and Sons.

Text-book of Botany. S. H. Vines, F.R.S. London : Sonnenschein and Co.

Practical Physiology of Plants. F. Darwin, F.R.S., and E. H. Acton, M.A. Cambridge : University Press.

British Flora : G. Bentham, F.R.S., revised by Sir J. D. Hooker, F.R.S. London : L. Reeve and Co.

III. *Diagrams.*

Henslow's Diagrams, London.

Oliver's Illustrations of Botany, London.

Errera and Laurent's Planches de physiologie végétale, Brussels.

IV. *Models.*

Those of R. Brendel. Berlin, W., Ausbacherstrasse 56.

CHAPTER XII.

PHYSIOLOGY.

Is it wise to teach Physiology at school? As knowledge grows, the struggle amongst subjects for places in school-curriculum and professional training increases in severity. While, on the one hand, there is a demand for wider knowledge, there is on the other a necessity for limiting study to the subjects of greatest usefulness. Every subject has to stand up and vouch for its own utility. Its value as a means of education carries less weight now-a-days than its value as an end. That it is itself a desirable possession in after-life is reckoned as more to the point than the plea that it fits the scholar both to acquire other possessions and to enjoy them.

Modern education utilitarian.

If this be the tendency of modern education, it may be thought that Physiology runs but little risk of failure in the competition for a place. Its usefulness is so well established that it is sure to be taught unless there be hidden drawbacks to its teaching.

The subject is so wide that it lends itself to many kinds of treatment, but whether it should be taught in schools at all depends upon: (1) the kind of Physiology the teacher has in view, and (2) the reasons for learning it which he urges upon his scholars.

It is a dangerous subject for many reasons.

Dangers of improper teaching.

Boys and girls, whatever their age, are naturally so self-conscious as to make it extremely undesirable that anything should be done to attract their attention to their own persons. The less they recognize the existence of their bodies the better. To eat when hungry, sleep when tired, run and jump when the excess of nutrition over tissue-waste puts explosive energy into their limbs, should be instinctive actions which require self-control to check rather than effort to initiate. It is dangerous to call attention to these actions lest they lose their spontaneity. Nor is it only in children that there is a risk of the mechanism being hampered in its action by the mere recognition of the fact that it is a mechanism; older people also are wise if they avoid watching it at work. The bashfulness of the stomach—to take a single example from among the organs of the body—is one of its well-known attributes. It never does its work efficiently when it is being watched. A chop in solitude and silence is more difficult of digestion than a city-dinner in merry company and amidst diverting surroundings. The kitchen-work of the body is done better when the brain goes to sleep than when the mind keeps a jealous eye upon this humble department of the animal economy.

"Have you always had a good digestion?" was the natural question with which a reporter opened his interview with the centenarian Professor of Chemistry—M. Chevreul. What more telling proof of the efficiency of this function could the aged Professor adduce than the unstudied answer—"I have never noticed"? Had it not worked well he assuredly would have noticed; but the not noticing contributed in no small degree to its easy working.

To save boys and girls from doing the body harm through ignorance is a great thing, but much may also be said in favour of leaving them in ignorance for the body's sake.

Self-study to be discouraged.

It may at any rate be safely asserted that, while it is undesirable to call the attention of children to the beating of their hearts, the drawing of their breath, the digestion of their food, it is more than undesirable, it is culpable, to say anything which will fix their minds upon the more secret functions of the body and thus to stimulate appetites from whose exactions they will suffer sufficiently whatever precautions are taken to give them the cold shoulder. Only those who have the responsible charge of children know the difficulty of acting for the best in these matters. On the one hand, much harm may result from ignorance; on the other hand, more harm may be done by instruction. Every honest boy suffers mental agony when he discovers in himself desires which seem peculiar to himself of all the human race, vicious, as he thinks, in tendency, and proving him to be especially degraded. A few frank honest words spoken without reserve by father or mother may take a load off his young life. A little officious meddling may bind his burden more firmly to him. That nothing should be done by teachers of Physiology to enlighten children as to the meaning of sex, or in any way to call attention to it, seems to be too obvious for discussion. Not even the great claim of modern education that it fits men and women to discharge all the duties of citizenship justifies a different view. That parents cannot do their duty to their children unless they are themselves instructed in these matters is clear enough, but the lives of children ought not to be spoilt in the expectation that they may some day be parents and have children of their own. Means must be found for enlightening them after they have reached a safe age.

Interdependence of mind and body.

Those who urge the teaching of Physiology ought themselves to speak as physiologists who have given time and thought to the subject and realize in its full force the interdependence of mind and

body. If this interaction is overlooked, it is easy to argue with great show of reason that children need instruction to enable them to direct the functions of the body, that there is danger in leaving them to the unguided influence of their instincts. We must, however, look at these questions as observers of the animal economy as it is, not as idealists building a body according to our own speculations; and the observation needs to be kept constantly before us that body and mind seldom meddle with each other's business for good. A healthy child has no body. It is simply a mind which exhibits its personality in the class-room, the playing-field, and the refectory. Let it find out that it has hands, and the easy grace of their movement is lost. Let it discover that it has a stomach, and food is put into it without appetite, or abstained from when the system needs renewal. Call attention to the fact that it is endowed with capabilities of continuing its race, and from that moment the Nemesis which is born of death—the urgent necessity to reproduce our kind—will awaken instincts which are better left to slumber.

"A little knowledge is a dangerous thing."

If all teaching of Physiology is to be stopped the moment that there is danger of its calling attention to self, one of the chief reasons for which it is often advocated is swept away. For, without a knowledge of the organic functions of the body, Physiology can do little to help men and women to take care of themselves. One of the benefits which it is expected to confer is the power of self-protection. It is supposed to fit a man to act as his own medical attendant. But even if the whole field were open to us and a large allowance made in the school time-table for instruction, we doubt whether this end would be approached. "The best text-book of medicine is Foster's *Physiology*" was the weighty although epigrammatic summary of his advice concerning the selection of medical text-books which a great London physician offered to the

students assembled at his inaugural lecture. Heartily we endorse this sentence, but how few there are who have the time to read these five volumes of closely reasoned argument or to remember the teeming observations upon which the author bases his conclusions! Constantly he leaves us in doubt; he has merely summed up the evidence so far as the case has yet been heard; we are in a position to appreciate any further developments which may come under our own observation. Probably seven years may be taken as the average length of a medical student's training; but few would dare to boast that in seven years they had mastered Foster's *Physiology*. If they know the contents of every page, they will be the first to allow that, instead of having simple rules by which to try the various deviations from healthy action which come before them, their training has only opened their eyes to the difficulty of the subject. Not after many years of observation and reflection upon the working of the body in health and in disease can they hope to feel that they understand its physiology. And this is a subject in which inexpert experiment may do much harm. A little knowledge of Physiology is a dangerous thing. It is the parent of fads and sickly fancies. Half the 'opathies and 'isms of those who assert themselves strong-minded are begotten of ignorance. A lively intelligence and a small stock of information will enable anyone who thinks at all to find a plausible objection to every creed. It needs a logical mind and well-stored memory to qualify a man to appreciate the meaning of a mass of evidence and nicely to appraise it. The peculiarity of our subject is that its value is thought to lie in its applications, and these applications are not to indifferent objects but to the scholar himself. This fount is supposed to have healing virtues, and therefore it is that we emphasize Pope's dictum, "drink deep or taste not the Pierian spring."

Crede experto is a safe maxim in medicine, usually followed,

we believe, by doctors themselves. When anything goes wrong within, it is wise to place the "case" in the hands of an expert, and to try and benefit not only by his advice but by the discipline of following it. We cannot hope that a slight acquaintance with Physiology will help in the least in the treatment of illness. It may do much to prevent mischief, to guard against the diseases which result from mismanagement, but, for this, study is needed of those very branches of Physiology which, for reasons already stated, we should exclude from the school-curriculum. Even its value to adults may, as we have just indicated, be much exaggerated. Certain it is that the benefits to be derived from the practical application of physiological knowledge do not override the drawbacks to its acquisition by young people.

That it enables a child to control its functions, and that it will be useful in after-life as a groundwork for household medicine, are two reasons for teaching Physiology which might, until examined, have been supposed to carry weight. The first we disallow on the ground that it is more dangerous to call attention to the functions of the body than to let them have play unobserved, while, so far as the second reason goes, we believe that medical treatment is best left to the doctors. Has Physiology lost all claim to a place in the school curriculum because these two reasons for teaching it are disallowed? We think not. The study of Physiology has most valuable qualities as a mental discipline, even though we go as far as the facts warrant us in discrediting its utility.

Use in arousing interest.

In the first place, the human body is to many children a perfect Bluebeard's chamber in its effect upon their curiosity, and we hold it to be one of the first duties of a teacher to take advantage of such an instinctive liking for enquiry, and to cultivate from it a love of learning in other, and, at first sight, less attractive directions. An object-lesson upon such a subject as the blood-

corpuscles and their work, or a sense-organ and the way in which we use it, rivets attention at the time and stimulates to future study. There is no sufficient reason for confining the child's enterprise in investigating the world it lives in to the general properties of matter and such study of animals and plants as is usually defined by the term Natural History. Its curiosity may fairly be gratified by telling it something about the phenomena of its own bodily existence. Care should indeed be taken to avoid reference to functions to which it is undesirable to attract attention; but, although these constitute a long list of exceptions, there is plenty left which is free from drawbacks.

Starting point for other subjects.

It is not so much the teacher's business to supply the furniture of life as to provide tools for making it. Above all his mission fails if he does not provoke a desire to use the tools. For many young minds Physiology has an attractiveness possessed by few other branches of natural science, and it has the unique advantage of allowing the teacher to use it as a starting point for teaching all other subjects. Physiology is the study of the action of natural forces upon the body, and may be made the excuse for lessons in chemistry, mechanics, hydrostatics, optics, acoustics, and all other branches of physics; and, indeed, it cannot be understood without a knowledge of these sciences; while, for its illustration, the whole animal and vegetable kingdoms need to be put under contribution, for there is no modification in environment which does not result in altered structure and mode of action.

Evolution of Mind.

Modern education is founded upon psychology. The child's mind in its growth goes through many stages. We know that it is, in its development, recapitulating—with many abbreviations and omissions it may be, but without additions—the history of the race. The schoolmaster may, if he please, fancy himself face to face, not with a

class of little minds in progress of development, but with groups of savages in various stages of civilization. Each stage has its characteristics, of which he must take advantage if he wish to get the best possible results. The first phase, so far as it relates to natural science, is the phase of acquisitiveness, the savage desire to possess, to collect—whether postage stamps, eggs, butterflies, or minerals, it matters not. The boy plays over again the laborious process of accumulation through which generations of thrifty ancestors have passed. To their self-restraint and watchfulness he owes his position in the world. Like them he plans and works and makes his little sacrifices to keep the credit side of the account in excess of the debit—a string of horse-chestnuts is to him as precious a possession as a field or a house was to them. This passion for collecting may be turned to the best account. Collecting teaches observation as no other occupation can: "This five-cent stamp belongs to a different issue from that," "These two butterflies are not of the same species," are conclusions based on careful comparison of form and marks and colour. The proper care of a collection is in itself a training in thrift and order, and may have a far-reaching effect upon character.

Experiments.

The second phase in natural development is marked by a desire to see what happens—to try experiments in physics and chemistry—to observe the habits of animals and the circumstances of the lives of plants. It is another form of observing, without the desire to possess as its motive power. It leads most naturally to inductive reasoning. Differences in action supply the reasons for differences in form. It even leads to the most difficult kind of induction—the devising of experiments, the forecasting of phenomena which have not as yet been observed. This phase of development the teacher must on no account overlook. It is a faculty which needs strengthening, and the time-table must make room for any subject which brings it out. There are many who

know for one who can *think*. The great danger of natural science—the weakness of the "modern side"—is due to the credit which is assigned to the power of recollecting names and facts. The boy who can remember most is reckoned the most learned. It is easy to mark for facts, very difficult to assign a value, in the early stages of training, to the argument by which they are linked together. At the Universities it constantly happens that boys who have taken entrance scholarships in natural science are overhauled during the course of their three years of preparation for "honours" by boys who when they entered the University knew no science at all. As a mental discipline the "modern side" is suitable for few. "Modern" boys make a great show at the time of leaving school. They know so much. Later on, when the stress of life begins to be felt, they find that they have not acquired the power of using their knowledge. "Knowledge comes but wisdom lingers." At the University they break down as soon as they reach the more abstruse parts of their subjects, when facts are left behind and arguments are based upon the laws derived from the analysis and grouping of phenomena. Like a man who no longer sees solid ground beneath his feet, they grow giddy. They have no chance of distinguishing themselves in the higher branches of their subjects.

Modern *v.* Classical Education.

Nevertheless the meagre results which often follow science-training are due not to the science but to the training. Memory needs cultivation, and, for this, facts and names and figures must be learnt. The power of thinking can only be developed by the grouping and explaining of facts. For this, even in its early phases, Physiology is highly suitable. Structural features and functional phenomena are pointed out; the pupil at once asks the reasons for these things. Wisely guided, he can be brought to find the answer for himself. Problems of all degrees of difficulty

Teaches to think.

may be propounded. At the end, the meaning of moot-points will need to be explained. Evidence for and against the various explanations which have been formulated from time to time must be placed in opposite scales, and the scholar will perhaps be left with a desire to find the answers for himself.

Ease with which Physiology is taught.

On the ground that it has a unique value in arousing interest, we recommend the teaching of elementary Physiology. It may be claimed, in the second place, that it does more than most other subjects to stimulate thought. A third argument in its favour is the accessibility of its "material." The apparatus and materials needed for the teaching of the natural sciences are costly to acquire and often costly to house in a suitable way. Museums and laboratories cannot always be had; but what so near as the human body? It is due to the fact that it *is* about the body that the subject owes its interest for many little minds. While therefore Physiology is one of the most natural and useful of subjects for object-lessons, we should not, in teaching it, follow any of the text-books with which we are acquainted. Attention should be aroused by asking what such and such an organ is for. Say it is the ear,—for hearing. What is the structure of the ear? Drum, ossicles, perilymph, endolymph, organ of Corti, all need to be described. What is meant by hearing? Molecules, elasticity, pulsatile vibrations, conduction of sound, noise, musical notes—a great part of the subject of acoustics needs to be explained before this question can be answered. How does the ear respond to sound? Many lessons may be easily devised, which, while they take advantage of the child's curiosity about its body, are quite free from the objections set forth in the early part of this paper. But from the first it must be taught as a pure science without any thought of application.

This short chapter treats the subject from a general point of

view. Much might be added by any teacher familiar with the routine of school-work. The writer has had no such experience, although on a good many occasions he has given extra lessons or addresses to boys' schools. The lively interest which Physiology excites is a sufficient proof of its attractiveness, and it is for such extra work that we venture to think that the subject should be reserved. Educational methods have undergone a profound change. Johnson regretted that, even in his day, the cane was going out of fashion; "But I hear Sir that they learn less, so that what they gain at one end they lose at the other." Latin, driven in with the cane, sums up Johnson's theory of education; and Johnson kept a school. We know that he gave a good deal of thought to the theory of education, albeit his practice was not successful, even with the two Garricks for pupils. Could any subject be devised more unattractive and useless than a dead language? Language is a means of communication. We set the boy to work from morning to night at a language which he is not allowed to think of as speech! But the results! I have no hesitation in saying that, on the average, boys trained on the classical side of our public schools make better men of science, of medicine, of law, than the boys who come to the University from the modern side; for the classics develope the power of sustained and orderly thinking. Some part of the credit for this most desirable result must be attributed to the discipline of working at a subject which offers in itself no temptations to work. No advantages, from the school-boy point of view, are to be derived from its study. It does not come near enough to his own life to arouse his curiosity. His only motive for learning his lesson is that his master tells him to do so; and this we think should always be sufficient.

If I may venture to generalize on so large a subject, the school-curriculum should comprise lessons of two different types. In the early part of the day, when the mind is

vigorous, the attractiveness of a subject is its drawback; but for the hours when healthy limbs begin to fidget and attention flags, lessons which the scholars like to learn should be kept in reserve.

Few subjects are so attractive as Physiology, few can so easily and inexpensively be made to serve for object-lessons. Perhaps no other subject lends itself so readily to the incidental teaching of other branches of natural science, or gives the teacher a better chance of beguiling the scholars' feet along difficult and laborious paths.

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